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INNER EAR AND CEREBELLAR CHANGES IN PATHOLOGIC FETAL POSITION; THEIR SIGNIFICANCE FOR STATIC DISTURBBANCES IN EARLIEST PERIODS OF LIFE AND FOR SOME ANOMALIES OF SPEECH.*

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The study of the physiological function of the labyrinth, commenced in 1824 and consummated by the work of the Utrecht school (Magnus, de Kleyn and their co-operators) resulted in the realization of the fact that not only anatomically but also functionally the vestibular organ should be divided into two parts; respectively, the otolith and the semicircular canal system. The former system mediates the reactions to position, the latter responding to the positive or negative acceleration of the movement, whether progressive or rotary.

The reflexes due to rotation, *i. e.*, nystagmus, by-pointing and fall, are well known from clinical experience and, as has been established by Bartels, Alexander, Borries and Schaltenbrand, nystagmus and head deviation occur also in newly-borns. The last-named author has shown that by inclining the body in different directions, especially backwards, it is possible to obtain peculiar reflexes of the limbs to the effect that the upper limbs, when flexed at rest, violently extend and stretch laterally, whereupon they gradually come down and flex in elbows. These reflexes provoked by the inclination of the body

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and by progressive movements are of labyrinth origin. They are well marked in children as early as a few days after birth and disappear by the end of the first year. Schaltenbrand doubts that these reflexes should take any significant part in the fetal period. By interrogating pregnant women he ascertained that the movement of the fetus is felt by mothers when at rest (after meals, at night), rather than when moving.

Also other reactions to progressive movements, including spring readiness and lift response, exist in neonati.

As generally known, the reactions to position are: *1.* apperception of the vertical; *2.* regulation of muscle tonus.

The apperception of the vertical is an extraordinarily sensitive reaction, particularly on orientation in the frontal plane. The evolution of this reaction has not yet been determined.

The control of muscle tonus has been traced to considerable details by the school of Magnus and is classed by the said school under three groups, which also are generally known, namely: *1.* contrarolling of eyes; *2.* reflexes regulating posture (postural reflexes); *3.* righting reflexes.

It is unnecessary to touch the first group, so far as concerns our subject.

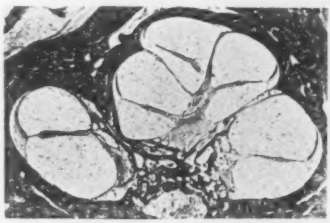
I shall make a few remarks regarding the second group, which should be divided into two sub-groups: *1.* symmetrical labyrinth reflexes; *2.* symmetrical or asymmetrical cervical reflexes. It is worth noting that Minkowski observed the last-named reflexes in fetuses only five months old.

In children special types of tonic reflexes have been described by Brudzynski and Landau. In the reflex of Brudzynski the flexion of the head is followed by the adduction of the limbs to the body and by their flexion. This reflex occurs rarely in sound nurslings and regularly in cases of meningitis (Schaltenbrand). The reflex of Landau is, so to speak, the reverse of the foregoing. If the child is supported on the abdomen, it erects the head into the normal position by the righting labyrinth reflex on the head. At the same time the lower limbs rise so that the whole body is concavely arched upwards. However, if the head flexes down, the limbs instantly sink.

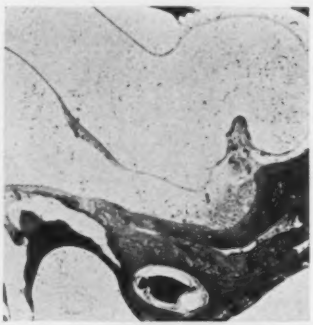
The third group of these reactions is represented by the so-called righting reflexes, which have been divided by Magnus into five subgroups: *1.* righting labyrinth reflexes on the head; *2.* righting cervical reflexes; *3.* righting body reflexes upon the head; *4.* righting body reflexes upon the body; *5.* righting optical reflexes.

The righting reflexes on the body begin to develop as late as two months after birth and exist through life, while those cervical occur even in newly-borns and their existence can be established only in the first three years of life.

These two reflexes combine for one purpose. They jointly control the erect posture and walking of man. Exactly the object is to insure this function, for there are two combinations of righting reflexes, each combination being apt to control said function. There



Case 1. Fig. 1. Considerable hypotonic degeneration of cochlea.



Case 1. Fig. 2. Advanced degeneration of crista and cupula of canalis semicircularis lateralis.

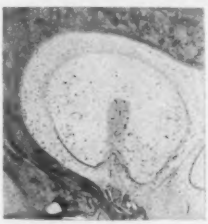
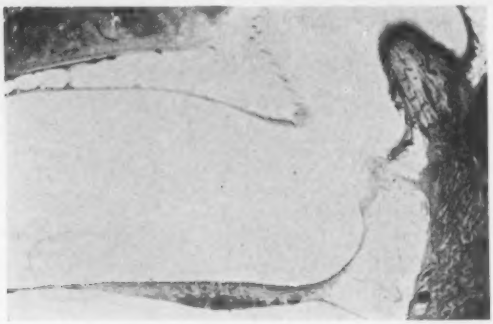


Fig. 2-A. Normal cupula.

are either righting labyrinth plus righting cervical reflex or righting body reflex, respectively, on the head and the body reflex on the body. Schaltenbrand carefully studied the development of these reflexes and he has found that the evolution of man's erection is accomplished by several stages. In the first stage, the child turns from the dorsal to the abdominal position (first six months). Later on follows erection upon all four (second half of first year). This is the quadruped stage, in which motion begins with a torsion of the



Case 1. Fig. 3. Advanced degeneration of macula utriculi.

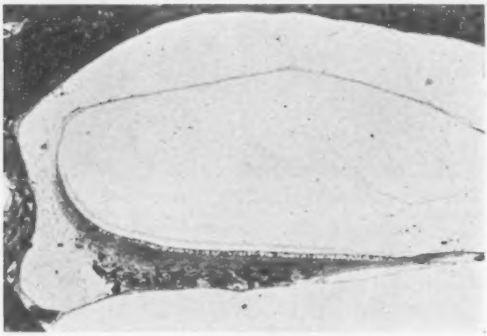
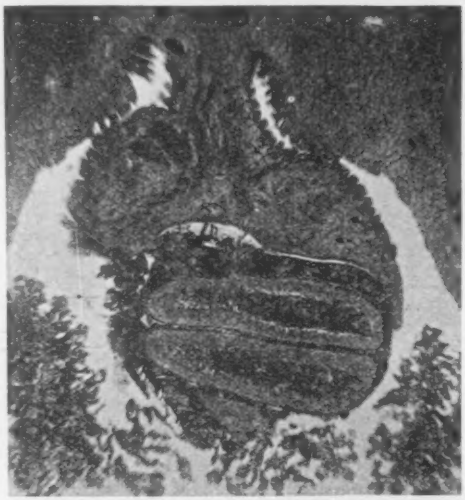


Fig. 3-A. Normal macula utriculi.

Case 1. Fig. 4. Defect in free wall of sacculus.

backbone. At a later stage the child manages to sit up from this position, and later yet also to stand up.

In the second and third years the mode of rising changes, the child does not turn from dorsal to abdominal position but shifts the weight of the body upon one hip, and supporting itself with both arms on the same side, sits up and from this position stands up, whereat the backbone is considerably distorted sideways. The final mode of rising is the one at which the child sits up from the dorsal position, leaning symmetrically on both arms without distorting the backbone, and then again symmetrically erecting.



Case 1. Fig. 5. Heterotaxis in lingula.

This evolution is usually completed by the beginning of the fourth or fifth year.

In man it is characteristical that sitting up is an intermediary stage of erection and that all the reflexes co-operating in this act can be suppressed to considerable extent.

The anomaly of the righting body reflex upon body in pathological cases can assert itself in a primitive form (quadruped stage and the like) in older individuals.

The optical righting reflexes are also very important for stability, as is known from Romberg's experiments on tabetic patients, in

which the righting body reflex upon the body is impaired and the optical reflexes are absent.

It is striking to observe that numerous labyrinth reflexes may be ascertained at the very birth, that in the first year of evolution the reflexes either rapidly change and appear only in some periods or they are merely altered. However, in the fourth to fifth year this evolution stabilizes.

From this it is obvious that the post-natal static and locomotion functions are considerably influenced by the vestibular apparatus. It is only a logical consequence that we ask whether also the typical position of the fetus, and possibly even the attitude of the fetus, is likewise controlled by the vestibular apparatus, in view of the fact

Case 2. Fig. 6. Hypoplasia of the right amygdala in cerebellum.

that the labyrinth reflexes have been detected both in fetuses and immediately after birth.

Towards the end of pregnancy the position of fetuses is very constant (97 per cent cephalic presentation) and is so important for normal parturition that it can be designated as the physiological position.

The question as to what controls the position of the fetus towards the end of pregnancy is very old, for Aristotle was the first to attempt an explanation by extending his gravitation theory. According to this theory the head of the fetus reaches the lowest point because its specific weight is the greatest. However, the experimental results and computations of Seitz, Schatz and Duncan have revealed the fact that it is the caudal end which is specifically heavier,

except in the last six weeks, at which time in some cases slight preponderance of the head has been observed. The latter circumstance may rather prove a suitable condition for another form of control, than the controlling factor itself.

Griffith has ascertained that the metacenter, *i. e.*, the center of balance of the floating fetus, is somewhat nearer to the caudal pole than its center of gravity. By this fact he endeavored to explain

Case 2. Fig. 7. Hypoplasia of the right half of cerebellum, especially of amygdala.

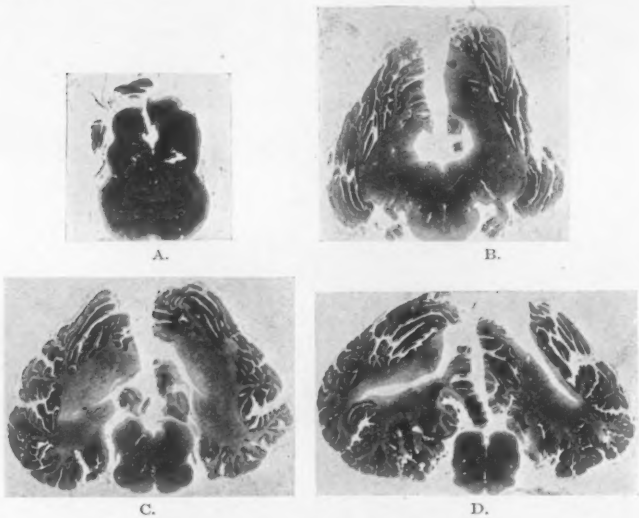
Case 2. Fig. 8. Heterotaxis in lingula.

Case 3. Fig. 9. Bilateral hypoplasia of amygdala in cerebellum.

the normal position of the fetus, assuming that with the head downward the fetus is in the position of equilibrium. Still, these conditions exist later than begins the stabilized position of the fetus; indeed, they do not exist before the eighth and the ninth month of pregnancy. Moreover, the distance between the two points is an insignificant one, about 5 m.m., so that it cannot have the mechanical effect supposed by Griffith. Also, this fact may provide a convenient

condition for regulation, rather than prove the factor controlling the position of the fetus.

The accommodation theory of Simpson presupposes a close relation between the surface of the body of the fetus on one hand and the wall of the uterus on the other. The theory also claims that by skin reflexes the fetus gets from a less convenient position into that more preferable, *i. e.*, head down toward the lower segment of the uterus. According to the corrective theory of Kristeller the chief factors controlling the position of the fetus are the tonus and contraction of the uterus.



Case 3. Fig. 10. Cleft of the vermis of cerebellum with secondary fissure of nucleindentati; the cleft reaches even the mesencephalon.

The results of the aforesaid authors have proved:

1. That when the fetus begins to revolve in order to assume the cephalic position (in the sixth month), the head is specifically lighter than the caudal pole.

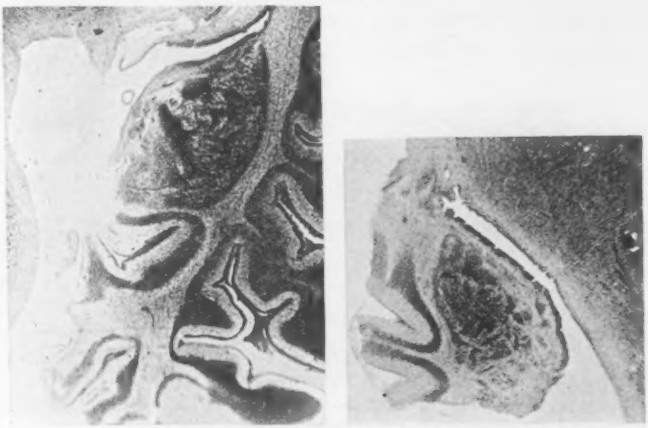
2. That at that time there exists no close reciprocation between the surface of the body and the wall of the uterus.

3. That at that time the metacenter is not nearer to the caudal pole than is center of gravity.

From the first fact it is plain that the theory of Aristotle cannot hold good, the second fact speaks against the theory of Simpson and

Kristeller, the third against the teaching of Griffith. On the other hand, none of the facts contradict the explanation of the mentioned position by a static function of the fetus itself, a function reflectorily controlled by the organ which has been proved to serve in conjunction with other reflexes, the purpose of orientation in space. This assumption of course has to be supported by evidence.

In favor of this view speaks the fact that it offers a uniform regulation of movements and positions in all the periods of life, and that it is compatible with the modern physiological theory of the kind of said regulation and, finally, that all the above-mentioned facts



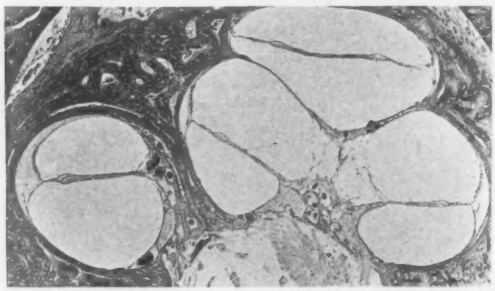
Case 3. Fig. 11. Heterotaxis in flocculus.
Case 1. Fig. 5. Heterotaxis in lingula.

established by physiologists and obstetricians can be joined by this explanation.

Further, this explanation is backed up by the fact that the vestibular organ is developed at a remarkably early period. W. His, Sr., has ascertained that the vestibular nerve is founded first of all on the sensory nerves, and W. His, Jr., has found that first of all, the foundation of the superior and the lateral semicircular canal is laid and only later on that of the inferior semicircular canal. Bechtierew has discovered that the vestibular nerve myelinizes long before the cochlear and other sensitive nerves. Thus he has also ascertained that the triangular nucleus pertains to the vestibular nerve exactly as does

the nucleus bearing his name. Flechsig has studied the myelogenesis of the vestibular nerve and in accordance with the observations of His, Jr., he has found that first the branch for the superior semicircular canal myelinizes as far as the ganglion of Scarpa and even farther on towards the oblongata (in a fetus, only 16 c.m. long). At that time also the ramifications of the macula sacculi and utriculi myelinize. Regarding the descending radix of the vestibular nerve, myelinization takes place in the fetus when this attains the length of 23-26 c.m. Further, Flechsig has ascertained that in a fetus 18-19 c.m. long the cupules with hairlets are already developed, the otoliths developing somewhat later. According to Minkowski the maculae develop when the fetus is only two months old.

Furthermore, Held has discovered that the reflectory arc myelinizes so that first develops the motor tract, then the secondary paths and

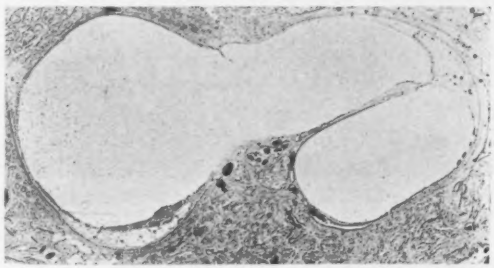


Case 5. Fig. 13. Advanced hypotonic degeneration of cochlea (left side).

finally the centripetal nerve. The same sequence is observed by the vestibular nerve. Indeed, according to Flechsig the motor nerves which control the labyrinth reflexes of the head and the cervical reflexes are to a great extent myelinized in the fetus only 15 c.m. long. The early development of the vestibular nerve, Flechsig explains phylogenetically. In a series of animals the vestibular organ is founded earlier than *e. g.*, the cochlear organ. He concludes that upon the various muscle groups tonic influence is early exercised, subject to the laws and rules observed by Magnus. However, he makes mention of no definite function. He states literally: It seems possible that at a relatively early stage this organ starts its function, since also the movements of the labyrinth fluid, which is influenced by gravity, prove a specific stimulus for the vestibular nerve, and can exercise their influence by the end of the fifth or by the begin-

ning of the sixth month. Further, he expresses the opinion that it would be desirable to make sure whether the movements of the fetus originate in the static organ at the time of myelinization, or after myelinization has been completed, *i. e.*, by the end of the fifth or by the beginning of the sixth month. In this connection we may point out that the period in which the myelinization of the vestibular nerve is accomplished covers also the stabilization of the normal position of the fetus at the end of pregnancy. Also, this coincidence bears out our explanation. Just as Flechsig, also Held and Minkowski, regard the vestibular organ as influencing the muscle action of the fetus. However, they do not speak of any definite physiological function.

The static theory of fetal positions might be further supported by clinically examining such cases as showed abnormal position during



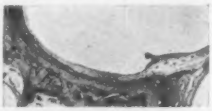
Case 5. Fig. 15. Defect in free wall of sacculus.

the fetal period. A considerable number of such cases appear at oto-laryngological clinics, the patients alleging troubles falling within the sphere of phoniatry. When I began to collect these cases, very soon a complete series was obtained from the patients treated by the phoniatric department. By further examination it was ascertained that this occurrence was not a mere coincidence. Out of the said series (dating from 1923) there were nine cases in which I have found, besides an anomalous position during the fetal period (transverse, or by the caudal pole), also static disturbances in the first post-natal years, *i. e.*, retarded power of sitting, standing and walking. By examining the vestibular apparatus paradox reaction was found, to the effect that the reaction to turning was preserved, while the caloric reaction was absent. Only in one deaf mute there was no vestibular reaction. In two relatives of one of these cases the caloric

reaction was partially preserved and also out of the disturbances constituting the above syndrome, only some were present. In two cases showing either paradox reaction or absolute indifference of the vestibular organ the static disturbances were but partial; in one case there was an almost completely paradoxical reaction (minimum nystagmic reaction with 300 c.c.m. of water, 27° C.), with the typical syndrome.

As a rule, in such children deficiency in locomotion, shown by inadroitness in playing, walking, running or gymnastics, is observed for a long time. After my study of the work of Schaltenbrand I examined in three cases with pathological position during the fetal period the characteristic mode of rising, and in two of them I have found an anomaly of this function, manifested as a lower evolutional stage. Thus, *e. g.*, a girl, age 18 years (No. amb. f. 243, year 1923), subjected to an examination repeated several times in different arrangement, rose from the dorsal position so that she turned onto the left hip and, resting on the left arm, sat up. From this position

Case 5. Fig. 14. Degeneration of macula utriculi (left side).



Case 5. Fig. 16. Degenerated crista and cupula of canalis semicircularis inferior.

erection was effected by an inclination to the left and by lifting on the left arm. Another case was that of a boy, age 10 years (No. amb. f. 255, year 1923), in whom the anomaly was much more marked. His rising was irregular, showing many variations. At first he turned fully onto the right hip, then he sat up, and finally got up. On lying down he rested on the right arm, turned to the right. When lying down the second time he came down on the right knee, stretched on the hip and fell upon the back. When lying down the third time he turned to the right and without sitting first he let the dead weight of his body fall on the back. In both these cases the alteration of normal rising and lying down is seen quite distinctly, *i. e.*, we observe not only a retarded development of righting reflexes, but also a disturbed sequence of the various phases.

It is to Seemann that we owe the establishment of the fact that the above-mentioned syndrome is sometimes attended by a speech defect, known as audimutitas. The cases constitute a special group of patho-

logical positions of the fetus. No doubt the cases represent a mere fraction of the total number of pathological positions, a fraction which, however, is the most important for the explanation of normal static functions. By obstetricians this special group has not been included in their statistical returns; indeed, even in the group of pathological positions of unknown origin, no room has been allowed for it.

Furthermore, Seemann has ascertained that the combination of speech defect with static anomalies in the post-natal period can appear also when the fetal position was not a pathological one. Still, as far as I have examined such cases I have even here invariably detected anomalous vestibular reactions.

The anomalies in the otolith system appeared to provide the principal evidence for an anatomical base of the above-mentioned clinical symptoms.

Seemann in attempting to solve the problem of the anatomical base of audimutitas concludes that considerable importance must attach to a disturbed co-ordination of muscle action, which is seen in cases of retarded development of speech and was observed also by Gutzmann. By more closely studying 100 of Fröschel's cases, Seemann has found that normal walking existed only in 12 per cent. Basing on the anomalies in the vestibular organ observed by myself and concluding from his own observations and from literature, then by taking into account the close co-operation which exists between the vestibular organ and the cerebellum and between the cerebellum, brain and medulla; and, finally, having regard to the function of the cerebellum, Seemann holds as probable that "the unretarded and normal evolution of speech is contingent on an intact cerebellar function and if the cerebellum does not exercise its controlling influence upon the complexes of co-ordinated verboarticulative movements, the development of speech is temporarily suspended". Later on, the anomaly is compensated.

The anatomical base of all these anomalies would be best established if in cases of developed audimutitas it were possible to examine both the peripheral and the central static organ. Such a case can come in hand only by a very lucky coincidence. Still, in my opinion, the hypothesis of Seemann can be regarded as considerably supported —at any rate for one class of these cases—by my pathologically histological observations which I have made on such newly-borns as were pathologically presented and died. So far I have studied six of such cases and in five of them I have detected anatomical changes of the static system.

Review of the examined material and of observations made.

Case	Name	History	Fetal position	Temporal bone right	Temporal bone left	Central nerve System	Remark
1	Holubova	Mother began to walk when 3 years old	transversal	Hypotonic degeneration of neuroepithelium in the cochlear and vestibular parts; defective free wall of sacculus	Not examined	Heterotaxis in lingula of cerebellum	
2	Zemanova	Grandmother found to bear twice by the caudal, twice by the normal pole	By the caudal pole	Find normal except for 2 distinct structures of free wall of sacculus	Hypotonic degeneration of the whole internal ear. Defective free wall of sacculus	Duplication of oral pole of principal olive right; hypoplasia of dextral amygdala in cerebellum; bilateral heterotaxis in flocculus; segmentation of dorsal lamella of either n. dentatus; extensive heterotaxis in lingula of cerebellum	
3	Smutna	Mother old 42 with normal type pelvis, B. W. R. negative 2 abortions, 2 normal childbirths, 3 times by caudal pole and twice position transversal	transversal	Normal	Normal	Aplasia n. Bechterewi lat. dex.; hypolasia corp. quadrig. lat. dex.; cerebellum: both amygdalae defective; vermis with total diaschisis orally extending to mesencephalon; fissures in hilums of n. n. dentati; heterotaxis in flocculi, heterotaxis in lingula; hemorrhage diffused on base	

Review of the examined material and of observations made.

Case	Name	History	Fetal position	Temporal bone right	Temporal bone left	Central nerve System	Remark
4	Furova	Mother old 16, pelvis normal, premature parturition, venereal inf. negata	By the caudalpole	Normal	Normal	Not examined	Atresia ani
5	Zvolankova	2 parturitions: 1 normal, 1 transversal	Transversal	Normal	Hypotonic degeneration both in cochlear and vestibular part. Defective free wall of sacculus	Not examined	
6	Masek	2 presentations by caudal pole 2 abortions, then presentation by caudal pole	By the caudal pole	Anomalous development of the labyrinth capsule and of the cochlea; degeneration of vestibular apparatus; anomalous development of middle ear	Hypotonic degeneration of neuroepithelium of the whole internal ear	Not yet examined	

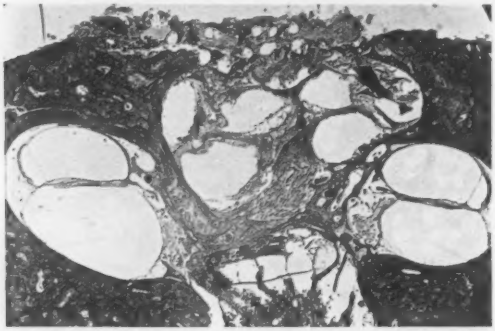
In one newly-born with normal fetal position bilateral hypotonic degeneration of the cochlea has been found with normal condition in the vestibular organ.

In five out of the above cases pathological changes in the static system have been ascertained. From the negative finding in the fourth case it is impossible to make any conclusions, as the central nerve system has not been examined.

Our observations can be divided into two classes : *1.* Changes found in the internal ear, both in the cochlear and the vestibular portion; besides, changes in the central nerve system, ascertained particularly or only in the cerebellum. *2* . Changes found solely in the central nerve system, *i. e.*, in the oblongata, midbrain and cerebellum.

These observations can without violence explain all the clinical symptoms, both of the mentioned syndrome and of retarded speech.

According to the observations made by Hesse the hypotonic degeneration of the labyrinth is very rare in children, the more so in newly-borns, and thus it cannot be regarded as a mere coincidence if we meet with it so frequently in cases marked with pathological fetal position (in four out of six), and we have to conclude that there is a causal relation between them. The same opinion we must form in respect of the central changes of these cases and of the one in which there have been detected no peripheral changes, for such changes, otherwise fairly rare, exist in all our cases—to a varying extent, of course—and affect such parts of the central nerve system as have been proved to comprise the centers and paths which control



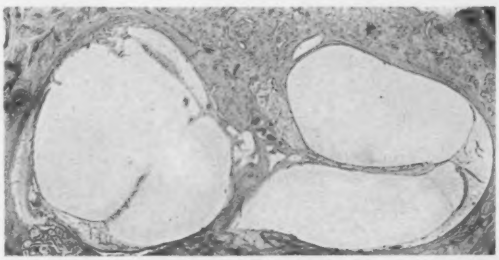
Case 6. Fig. 17. Heavy disturbance of the development of the cochlea.

static functions. Hence we can assume that such peripheral or central changes produce the static disturbances of the described syndrome. The extent and the localization of the changes vary and thus it is no wonder if in details the clinical aspects of the anomalies differ or if even the absence of some of the symptoms has been ascertained.

By the changes detected in the labyrinth we can also explain the paradox reaction ascertained in the clinical cases (positive on rotation, negative on calorization). Not knowing the essence and extent of labyrinth changes, I thought it possible to explain the reaction by the results of experiments of Borries, who has found that in pigeons the reaction on and after rotation is contingent on the integrity of the canaliculis, the reaction on calorization depending on the integrity

of the otolith system. From these experiments I concluded that in our cases we have the maculae disturbed with the canaliculi intact. However, our observations have shown that the degenerative changes are usually affecting the entire vestibular apparatus. On the strength of these observations and by the application of the streaming theory of Bárány (die Strömungs-theorie), it seems possible to explain the aforesaid paradox reaction to the effect that the irritation is much more intense on rotation than on calorization, and that on a shrunken cupule or on a bare crista without cupule, the violent impact of the arrested rotation can induce the reaction which cannot be brought about by the delicate stream arising on calorization.

Finally, we must mention the relation that may exist between our observations and the defects of speech which attend the static syn-



Case 6. Fig. 19. Defect in free wall of sacculus (right side).

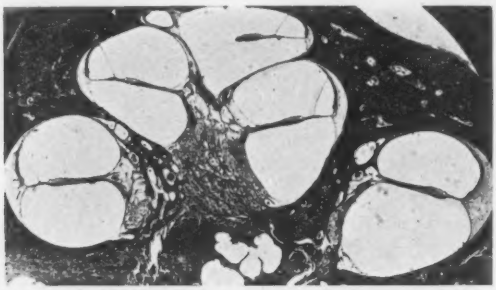
drome. These defects are: audimutitas and retarded power of speech due to defective hearing.

As audimutitas (idiopathic muteness), Seemann defines the condition of every child at the time when it hears but cannot speak. The protraction of this condition has been designated by H. Stern as mutitas physiologica prolongata. If the conditions continue in the third year we have to deal with a pathological case of audimutitas. This anomaly occurs in 50 per cent of cases from 2-4 years old, after 6-8 years it is rarer, and the instances observed by Gutzmann, Fröschels and Seemann in boys, respectively, 15, 16 and 10 years old, are an exception. Liebmann distinguished four kinds of audimutitas:

1. Motor audimutitas (the child, intelligent in other respects, understands speech, but cannot speak); *2.* sensory audimutitas (the child does not understand speech and cannot concentrate attention); *3.* sensory-motor audimutitas, a combination of the two foregoing; *4.* audimutitas combined with stubborn lisp.

As the etiological factor, Coen alleged alcoholism and blood relationship of the parents, Ziehen indicated inherited tubercular predisposition or syphilitic ancestors, while Fröschels suspected rickets, and it was believed that a functional anomaly was to be dealt with. Liebmann thought that the case was that of an insufficiently developed acoustic apperception and this opinion was used especially for the explanation of sensory audimutitas. This was explained by Gutzmann as no will to speak. This explanation, however, held good only for the motor forms of audimutitas (Seemann). Ziehen was of the opinion that the function of the center of Broca was deranged.

Seemann and Nadoleczny shut sensory audimutitas out of the classification of Liebmann. The cases described as such have an insufficient clinical acknowledgment. Seemann states that the peri-



Case 6. Fig. 20. Heavy hypotonic degeneration of cochlea (left side).

pheral organ has been preserved in a condition which is only speciously good; not infrequently he has found in these forms considerable defective hearing or blunt intellect (imbecility). He has not yet met with a case of pure sensory audimutitas and for that reason he admits only the motor and the motor-sensory forms in which he has often ascertained heredity.

It is very probable that the discussed cochlear degeneration is in some relation to the retarded development of speech, which condition used to be designated as sensory audimutitas and which in fact pertains to the group of defective speech caused by deficient hearing. Our observations would thus explain why such a defective speech at one time is and at another is not combined with pathological fetal position, or why the degeneration may affect either the entire labyrinth or only the cochlea.

The question of the importance attaching to cochlear degeneration has not yet been solved.

At this time the majority of authors do not doubt about an intravital genesis of these changes. At any rate, at the Collegium O., R., L., held at Zurich in 1927, there was nobody to oppose Wittmaack when he lectured upon this subject. Still, it has not yet been established what functional importance attaches to such pathologically anatomical changes. Wittmaack and his school (Runge, Hesse) believe that the dedifferentiation of the supporting apparatus in the organ of Corti, together with sensory cells, does not result in the obliteration

Case 6. Fig. 18. Degeneration of the cupula of the canalis semicircularis superior (right side, high power magnification).

Case 6. Fig. 21. Degeneration of ma u a vtri ul and cupula of canalis semicircularis (left side).

of hearing if the contact of the cell with the nonmedullated fibres of the cochlear nerve has not been interrupted. They back their view by clinical and histological observations made on adults. No doubt Steurer in discussing the pathological anatomy and pathogenesis of audimutitas is right when he states that these conclusions cannot be applied to individuals of tender age. Steurer thinks that the changes in question can cause also total deafness or very defective hearing if they develop in the earliest period of life their influence upon the evolution of speech being likewise unfavorable. Why, so far as the development of the acoustic paths is concerned there is a great dif-

ference between an adult and a newly-born. The myelinization of the acoustic nerve is not completed before the third month following the birth (Monakow). If the degeneration in the cochlea is developed before this period of time, the changes must unfavorably affect the development of the acoustic paths and of speech. While in an adult the acoustic paths and centers are functionally ripe, and even with a degenerated labyrinth render apperception possible, the functionally immature paths of an infant need not do so. Steurer is of the opinion that the threshold stimulation of the acoustic path in an infant must be greater for the learning of speech than is required in a fully developed organ for the retention of the power of speech. Steurer also states that the adults also resort to lip-reading.

It seems that the hypotonic degeneration in newly-borns is more frequent than congenital deafness, which is of a fairly rare occurrence. Hence we can assume that with the degenerated cochlea the development of the central acoustic paths and centres, and thus also of speech, is retarded or more or less suspended. An explanation like this is also in keeping with the views of Seemann, who states that we have not to deal with sensory audimutitas, but with an anomalous evolution of speech, due to defective hearing.

Moreover, the changes found on the cerebellum in the other group bear out Seemann's statesments upon the importance of the cerebellum for the origin of motor audimutitas.

It is not easy to decide which cerebellar changes can operate in that anomaly. Many authors, to be sure, have arrived at the conclusion that the cerebellum exercises an influence upon speech and voice; so far, however, there exists no uniformity of opinion as to the localization of the centre for this function. Bolk localizes it within the anterior lobe; Ingvar in that portion of the cerebellum which phylogenetically is the youngest, *i. e.*, either in the hemispheres or in the part situated behind the sulcus primarium; Jelgersma and Bonhoeffer also see it in the two hemispheres. In the case of right-handers, Stenvers localizes the centre in the right side hemisphere of the cerebellum; Brouwer, however, thinks that the localization must be bilateral and that to all probability besides the hemispheres; also, the vermis must be taken into account. Basing on his experience with the wounds inflicted in the war, Holmes states that defective speech can develop with changes both in the hemispheres and in the vermis. When the latter is affected the deficiency in speaking is of a more serious character.

Most recently Lauretta Bender experimentally attempted to prove the influence exercised by the cerebellum on the movements of

the vocal cords. She wished to test the results of Katzenstein and Rothmann, who, by injuring the anterior and the central lobe of the dog, impaired the movements of the vocal cords. The experimental results of these authors have not been generally accepted as conclusive. L. Bender has detected anomalies of a cerebellar nature in the respiratory movements of the vocal cords of all the cases in which the lingula was injured. The lingula is one of the structures of the basal stage of the cerebellum, to which structure, according to Ingvar, the vestibulocerebellar paths directly converge. It is striking to observe that in all of our three cases in which the central nerve system has been examined, the aforesaid portion of the cerebellum shows anomalous development; indeed, in one case changes have been found only in this part of the cerebellum. From these observations it is possible to conclude that the lingula can play a part in the pathology of audimutitas.

The anomalous development of the central nerve system is frequently hereditary. It is no wonder that also retarded speech is inherited, as Seemann points out, and our Case 2 shows that to all probability we can also speak of heredity in the case of pathological fetal positions.

The idea of examining the static organ in cases with pathological fetal positions has been very fruitful. It has brought out a series of clinical and pathologically histological facts, by means of which it is possible to explain some hitherto mysterious or insufficiently elucidated physiological functions and functional disturbances, and which will never lose their value, not even if here and there their contiguity and interpretation will be somewhat different than I have attempted to explain.

ABSTRACT AND SUMMARY.

Six cases with pathological fetal positions were studied. In two of them histological changes were found in the inner ear and in the central nervous system; in the third case the changes were in the central nervous system only. In the remaining three cases the brain was not examined, but in two of them changes in the inner ear were found. This makes a total of five cases with pathological findings, out of the six cases under study.

The peripheral changes consisted in a heavy hypotonic degeneration of the neuroepithelium in the cochlea and in the vestibular apparatus. Besides that, in one case there was an extensive primary disturbance of the development of the inner and of the middle ear. The changes were either unilateral or bilateral.

The central changes affected the oblongated medulla, the middle brain and partially even the hemispheres (hypoplasias, clefts and tectonic disturbances). But cerebellum was always or the only one which was affected. The changes were variably extensive, but always or even exclusively the lesion was found in the lingula.

These findings can form a pathologico-anatomical basis of a clinical syndrome, namely: Pathological fetal position, followed by delayed ability of sitting up, standing or walking of the baby. For the histological changes are found in the very organs regulating the static functions.

The changes in the inner ear explain also the paradoxic reaction (positive after rotation, negative after calorization), concomitant the mentioned syndrome. The irritation caused by the rotary movement is, namely, much more intensive than that caused by calorization. And the sudden jerk of the stopped rotation can produce a reaction on the shrunken cupula, or even on the bare crista without the cupula, which cannot be elicited by the fine current produced by calorization.

The findings mentioned above also correspond very well with two distinct groups of speech disturbances, which very often go with the above syndrome and which were described by Seemann. These are: *1.* Speech disturbances of those hard of hearing. *2.* Audiomutism, which Seemann already related to the functional disturbances of the cerebellum. The peripheral changes explain the disturbances of speech based on decreased hearing. The changes found in cerebellum are probably the anatomical substrate of the Seemann's hypothesis of the cerebellar origin of the audiomutism. The changes in the lingula are especially suggestive in these speech disorders, for it is an organ which was found by L. Bender to have a relation to the movements of the vocal cords.

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SIGMOID SINUS THROMBOSIS. CASE REPORTS.*

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The question of sinus thrombosis will frequently arise in suppurative middle ear conditions in either children or adults, and cannot be put aside lightly in cases with severe onset, particularly those with chills and sweats. According to general interpretation, it occurs more frequently in the acute cases than in the chronic, and may be by extension from an infection of the mastoid cells overlying the sinus groove, or by an extension from a perisinus abscess, which may be under great pressure; by metastases through the blood stream, or, most probably by limited thrombophlebitis of the minute veins communicating with the sinus, and this explains the production of a sinus thrombosis from a simple suppurative middle ear infection with no involvement of the mastoid itself. Pus around the sinus, the perisinus abscess, is really an extradural abscess and it may practically free the sinus from its usual attachments.

Owing to the low pressure in the lateral sinus, an infection may extend from the sinus on one side across the sigmoid through the torcular herophili to the lateral sinus of the other side, and there be produced a clinical sinus thrombosis on the side of the nonaffected ear, or it may extend downward to the subclavian vein. Extensions may be found in the petrosal sinuses as well. The presence of a thrombus low down toward the bulb may indicate an invasion directly from the floor of the tympanic cavity.

The cases may be classified according to their origin as primary, if occurring in acute middle ear infections, coming as they do directly from invasion or infection of an adjacent area. The secondary cases may come from any septic lesion about the head, such as boils or carbuncles, orbital cellulitis, or abscess, parotiditis, or infections around the teeth and tonsils.

Sinus thrombosis has been reported as a complication in 3 to 6 per cent of suppurative mastoiditis cases, by Chase in his article, "Lateral Sinus Thrombosis, with Report of Five Cases", (Ann. Otol., Rhinol. and Laryngol., 35:791, 1926); and by Yerker in 2.7 per cent of the cases in "Sinus Thrombosis as Complications of Mastoiditis" (Ann. Otol., Rhinol. and Laryngol., 34:528, 1925).

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The symptoms found in the typical cases are very striking and render the question of diagnosis relatively simple, with an accurate history and accurate temperature records. The mere presence of a perisinus abscess previous to invasion of the sinus itself does not give any such picture and is usually found only in the performing of the routine mastoid operation, while the lateral sinus thrombosis can be suspected early after its onset, though in the presence of a bilateral middle ear suppuration of equal gravity, so far as mastoid complications are concerned, the question of lateralization is rather a difficult one. The symptoms of the typical case are usually that of the ordinary suppurative otitis media or mastoiditis, which suddenly begins to run a wild temperature chart, chills, accompanied or followed by rapid rises of temperature, with excessive sweating, after which the patient appears very comfortable, and without any relation to the time of day. These symptoms are repeated in cycles and are simulated only by a pyelitis, which may be a complicating factor in female children, and makes for a great deal of obscurity in the diagnosis.

The occurrence of a leucocytosis or a change in the differential white blood count cannot be relied upon, though in the main there is a marked leucocytosis with a preponderantly large poly count. The symptoms recorded by the older texts, such as stiffness of the neck, localized pain or swelling over the line of the vessels, are not dependable. It is more frequently found to be the case that there is a localized tenderness well removed from the canal in the cases presenting perisinus abscess, rather than in the cases with a simple sinus thrombosis. It is questionable whether there is much more stiffness of the neck, except in a very advanced case, than could be accounted for by the underlying disease itself. Eye symptoms are usually those of toxemia, unless there is cavernous sinus involvement, and rarely do we find a Gradenigo syndrome.

The tests by compression of the jugular in determining the presence or absence of a spinal canal obstruction is of doubtful value in the opinions of most of the writers. It is, or at least was, advocated by Lyman, of St. Louis, or one of its modifications; but Brunner, of Vienna, expressing the views of his school in his lectures in this country, did not consider it reliable as a means of determining which of the two sides was affected in cases of double suppurative otitis media. It involves a lumbar puncture and a recording of the spinal fluid pressure and is made by applying digital pressure anterior to the upper portion of the sternocleidomastoid muscle on the side opposite the suspected thrombosis. If there is immediate rise in spinal fluid pressure, it is reasonable to conclude that the circulation in the jugu-

lar or lateral sinus on the opposite side is obstructed. If there be no rise in pressure, an occlusion of the suspected vessel cannot be present. It is evident that the disturbance of the circulation by pressure or manipulation around partially obstructed vessels would probably promote the breaking loose of emboli, or the taking up into the circulation of infectious organisms and bringing about the condition which we are endeavoring to prevent. By the same token, the disturbance of spinal fluid pressure would promote a circulation of the cerebrospinal fluid and give a possible extension from a circumscribed serous meningitis, which is Natures' protection, into a generalized purulent one.

The gross pathology of such a condition may vary markedly; infection and invasion around the wall of the sinus may have existed so long that the walls of the sinuses are covered with greenish or grayish granulations, and yet there be a perfectly patent lumen, with no indication of even a parietal thrombus, while another case may present a dark blue, shining wall, with no evidence of invasion and yet be completely filled by a coagulum. Naturally a direct invasion into the blood stream and a septicemia may exist with no gross vein pathology.

As before mentioned, the pressure is low in the sinus and the current of blood very slight and slow, especially around the periphery. Infection around the vessel wall may extend directly through the various layers, starting as a periphlebitis, until a true phlebitis has resulted, with an involvement of the intima and bacterial invasions of the blood stream. A parietal or lining clot only may form, or the entire lumen may become occluded and the sinus thrombus extend upward into the torcular herophili and downward to the subclavian vein, involving the communicating sinuses as well. Usually, however, the clot is much more limited, and may break down and liquify with a perfectly intact limiting wall of clot, protecting the rest of the circulatory apparatus. Intact bone, so far as gross pathology is concerned, may be found between the mastoid antrum and the lateral sinus, and yet a large amount of destruction in the vein be present.

The complications caused by this condition may be divided into the immediate or local, which are, of course, meningitis, extradural or subdural abscess, particularly cerebellar, or only minor complications, such as bone necrosis, involvement of the cranial nerves by extension, and symptoms due to interference with the circulatory apparatus. The remote complications are the ones we would expect from such an invasion of vessels by infection anywhere else in the body, such as bacteremia or pyemia. The infecting organism is not constantly

the streptococcus of various strains; sometimes there are hemolytic staphylococci or pneumococci; in fact, several organisms have been found.

Several authors have noted the recanulization of the vein; and restoration of the circulation has been reported, and this may take place in a clot extending down to the jugular bulb. Personal experience has shown that on palpation of a thrombotic sinus no pulsation can be found as a rule, but the French schools report exactly the opposite. (Lateral Sinus Thrombosis, E. J. Moure, G. Liebault and G. Canuyt, Technique Chirurgicale, Oto-rhino-laryngologique, Oreille et ses Annexes, 1922.)

The question of the proper operative procedure is one about which there is considerable difference of opinion. The Bordeaux school does not favor the systematic ligation of the internal jugular vein, feeling that the advantages of this ligation are an illusion. They do not feel that it cuts down hemorrhages or that it prevents the diffusion of infection, though admitting that the thrombotic vessel logically drains the area into the jugular, but claim that at the base of the skull there is a confluent vein which is important for its relationship with both the lateral sinus and internal jugular, and external or posterior jugular as well, and this is not blocked. There is one complication that might be mentioned as occurring in an exposed lateral sinus which becomes secondarily infected and breaks down, and that is the possibility of secondary hemorrhage, such as occurred in a case recently seen in consultation at Walter Reed Hospital, where the blood pressure dropped down to 55 over 35, within the course of half-an-hour. In this case a blood transfusion and then a ligation of the jugular and a clearing out of the sigmoid under local anesthesia was advised during the consultation, but owing to unforeseen factors arising, it was not carried out, and in about two weeks the patient died from a septicemia and septic bronchopneumonia. X-ray taken of chest showed rather diffuse infiltration the next day after the hemorrhage, probably infectious matter, went directly to the right heart and then to the lungs.

The operative procedures in vogue on the Continent, with the exception of the Bordeaux school, seems to be very much more radical than the ones here considered good surgery. They consist of removal of the infected thrombus until there is free bleeding in the wound and complete thrombectomy performed and claim the mortality only half as great as in partial thrombectomy. (H. von Fieandt, "Surgical Treatment of Otogenic Thrombophlebitis", Acta-Oto-Laryngol., Stockholm, 6:378, 1924).

The following case reports are selected as embracing various types of sinus thrombosis, and also a typical perisinus abscess, with recovery. Spontaneous discharge of a brokendown thrombus and recovery, with the formation of a fistula leading to the lateral sinus, was seen in Guantanamo, Cuba, in 1915. There, a case with a discharging fistula, about 2 inches behind, and at about the level of the left external auditory canal, with a purulent, fetid middle ear discharge, was seen and operated, making the usual skin incision, but extending from this incision a straight incision at right angles toward the fistula, following it to the site of the sinus, which had been obliterated, and in its stead a pus cavity, containing grayish-green pus and granulations, was found. This was cleaned out and the bone removed anteriorly, working toward the mastoid antrum and middle ear, completing the operation as a modified radical, similar to the one advocated by Crowe, leaving the ossicles intact. There was dense sclerotic bone between the fistula and the mastoid antrum; the usual formation after a long suppuration. No ligation of the jugular was, of course, needed, and no attempt made to clear away the wall above. This illustrates what Nature unassisted can do.

Case 1: Miss E. S., examined March 2, at office, radiographs taken and white blood count and differential made, and smears from discharge examined. Gave history of mild upper respiratory infection, pain in both ears, feeling of stuffiness about the head, followed during the night by spontaneous discharge, both ears, which had not abated, and pain, especially over right mastoid tip and just back of it, had kept up. Temperature ranged from normal, or slightly above, in the morning, to 102° or above, at night.

Chilly sensation, but no definite rigors. Purulent discharge under pressure, posterior perforation, rather large, usual injection of nasal and pharyngeal mucosa, no difference in the two sides. White blood count, 12,300. Differential count: Polymorphonuclears, 82 per cent; small lymphocytes, 12 per cent; large lymphocytes, 6 per cent. No abnormal cells.

Radiograph: "Examination of the mastoid area shows the presence of some opacity of the cells in the region of the right mastoid antrum and of a few cells near the tip. The remainder of the cells are clear. There is slight cloudiness of the right antrum, the remaining cells being clear, the septa on both sides are intact. The appearance is that of a mild mastoiditis of both antra, which does not warrant surgical intervention."—Coe.

Routine treatment and observation advised. Did not improve, became definitely toxic, pupils dilated, chills and sweats, and operation,

right mastoid, performed March 5, 1928, Homeopathic Hospital. Cell walls not broken down, limited pus in cells, prominent sinus, bony wall intact, but a cell found posterior to the sinus and low and encroaching on the sinus and full of pus. This corresponded somewhat to the tip and posterior tenderness. Left mastoid not opened, in view of the absence of tenderness, and report of the X-ray and the operative findings in the right, which were sufficient to account for symptoms. At the time of operation, possible sinus involvement was feared, owing to the presence and location of this infected cell. Temperature did not drop and condition failed to improve. Rigor and sweats but no definite chill; but plainly more toxic, and the advisability of surgical intervention decided upon.

March 13, exploration under light ether gas anesthesia of the right mastoid area. An exposure of the sinus showed a sinus without pulsation, walls discolored, hard of palpation, puncture under aseptic precautions, gave a thin, serosanguinuous fluid, no blood. Gloves and gowns were then changed, the jugular exposed, ligated, cut, and then attention again given to the wound. Sinus was opened widely, brokendown clot and pus found. Transfusion by Dr. Sappington, 500 c.c. of blood, indirect method, was done. Temperature dropped to normal and continued normal. Wound healed quickly and perfectly. Wound at site of jugular healed by first intention.

Case 2: E. B., child age 8 years. Admitted to Loudon County Hospital, Leesburg, May 7, 1926, service of Dr. Bailey. Purulent otitis media, right; white blood count, 16,600; poly., 79 per cent; lymph., 15 per cent; eosin., 1 per cent. Urine, negative. X-ray and physical signs of mastoiditis; operated by Dr. Bailey first operation. Second operation by Dr. Bailey, with Dr. Trible as consultant and assistant. There was not a normal course. Temperature continued for two weeks and then fell. Chills and sweats continued to run. Chills and sweats not noted, though at times complaint of chilliness and considerable perspiring at night. Child became very much weaker, blood culture negative; owing to extreme weakness, after it was determined to explore lateral sinus, the jugular was first ligated, under procain anesthesia, then under light gas ether oxygen anesthesia, the wound was recuretted, sinus plate exposed, cleared to the sinus, then the sigmoid opened. A brokendown clot was found, exposed, cleared out until it bled freely, and drainage was established using a small catheter inserted in the sinus, then small wicks placed in the wound. Slow, uneventful recovery.

Case 3: M. B., child age 8 or 9 years. Admitted to Naval Hospital, Annapolis, Jan. 23, 1928, during the time the civilian hospital

was out of commission; temperature 104°, pulse 140, res. 28, history of acute suppurative otitis media bilateral, following usual upper respiratory infection.

W.B.C., 20,000; polys., 77 per cent; micrococci in smears from ear discharge. Radiographs showed opacity, both mastoids; and usual clinical signs. Bilateral simple mastoidectomy. Neither dura nor sinus exposed; mastoid antra drainage with small rubber tubes. Patient looked sicker than gross mastoid pathology warranted. Temperature ran a hectic course for two weeks (Fig. 5); extreme deafness; right wound healed smoothly; considerable pouting of left and low tip tenderness on that side. Blood culture negative. Eyegrounds negative. Feb. 6, temperature reached 104.6°. Signs of sepsis, exploration of left mastoid wound showed necrotic sinus plate and thrombosed sigmoid.

Gowns and gloves changed, neck prepared and ligation of left jugular performed. Slow, uneventful recovery, temperature dropping in about seven days. Organism hemolytic streptococci.

Case 4: W. V., age 9 years. Suppurative otitis media right, spontaneous rupture, free discharge, following usual upper respiratory infection; had persisted for about 10 days when first seen at his home, April 7, 1928. W.B.C., 19,700; polys., 76 per cent; small lymph., 22 per cent; large lymph., 2 per cent; temperature 100°. Put to bed, given usual treatment, kept under observation. April 14, 1928, W.B.C., 21,000; polys., 71 per cent; small lymph., 25 per cent; large lymph., 4 per cent. Radiograph taken and reported as subacute infection of right mastoid. Admitted to Children's Hospital, operated upon, and brokendown right mastoid found, no exposure of sinus or dura, sinus plate thin, intact, sinus showed clearly as darker than usual and appeared suspicious. Uneventful course, discharged April 22, to home, to be dressed, and later dressed at office. Did not continue to improve, had deep-seated pain and frontal headache (Fig. 7). Readmitted to Children's Hospital April 29, 1928, and April 30, right lateral sinus explored, parietal thrombus found, extending from an emissary vein. Jugular ligated, usual method. The thrombus cleared away. Discharged from hospital May 10, 1928, apparently recovered. Organism hemolytic streptococci.

Readmitted after about two weeks' interval. The first week had appeared normal, no pain, no elevation of temperature, wound healing rapidly then, had been nauseated, occasional vomiting; attacks subsided, and after an interval of apparently normal convalescence there was a return of vomiting and headache. At this time, owing to the history of previous similar attacks, and to rule out any child's dis-

ease, he was examined by a pediatrician, but showed no general causative factors. Temperature, this time, 99°, rarely 99.4°, pulse 80 to 90, respiration 20 to 24, but continued frontal headache and nausea and vomiting. Then a continuous nystagmus to operated side, eyegrounds suspicious, but no papillitis. Diagnosis of abscess right hemisphere of cerebellum made. Dr. H. H. Kerr, neurosurgeon, called as consultant, and independently arrived at same diagnosis and on exploring right hemisphere with brain explorer from the posterior aspect of cerebellum, abscess found by him about 2 c.m. below surface. Pus showed hemolytic streptococci. Patient reacted from operation but became worse in a few days and the condition terminated fatally.

In this case there were not the typical chills and sharp rises and falls of temperature. Whether the invasion of the cerebellum modified the picture or not is uncertain. The deep site of the abscess is not typical of cerebellar abscess of otitic origin.

Case 5: H. R., age 7 years. When seen May 26, 1928, had temperature 105° by rectum, suffering from acute otitis media, bilateral; complication of scarlet fever. Right drum dusky purple, bulging, had been opened previously by pediatrician and had discharged for four or five days; left drum dull, inflamed, had also been discharging. Patient had had chills and profuse perspiration, both drums incised, discharge scanty, serosanguinuous in character. May 26, no improvement, temperature reached 106° by axilla, two hard chills, W.B.C., 18,100; polys., 83 per cent; pain on right mastoid.

Removal made to contagious annex, Garfield Hospital, and mastoid, right, radiographed, W.B.C. again taken. Radiographic report: homogenous haziness on right mastoid. Mastoidectomy performed, neither sinus nor dura exposed. It was highly probable that the infection had extended beyond the mastoid, but conservative lines would indicate letting this alone until one could see the effect of the mastoidectomy. Blood culture taken, later report negative. Temperature did not drop, reached 105.4° night of thirty-first (Figs. 9 and 10). Exploration of right lateral sinus made June 1, hard and tense purple sinus found. This case did pulsate on palpation, the only one in the series. Exploratory puncture under antiseptic precautions negative for blood or pus, apparently solid.

Jugular ligated by Dr. G. B. Gill, first assistant and consultant, assisted by Dr. P. S. Constantinople. The sinus opened widely, brokendown clot found, cultured, report late returned: Streptococcus hemolyticus and staphylococcus albus. Transfusion, indirect method, by Dr. Selinger, about 400 c.c. blood. Temperature dropped and

stayed down for about 48 hours, then rose to 104.4°, slight chilliness, then dropped for about 36 hours and rose to 104.6°, dropping for about 36 hours and then to 104.2°, then down for 48 hours and up to 103.2°, then dropping and not rising after that above 100.2° rectal, and only that once. The reason for the rises after operation are open to question. Possibly an extension upward toward the torcular took place; it was nearly decided to reoperate and continue exploration that way. Brain symptoms were eliminated by Dr. H. H. Kerr. Possibly extension through the occipital vein, according to the theory of the French school, took place. Mild invasion of the general circulation, insufficient to give positive blood culture, might have been taken prior to the operation. Recovery excellent.

Perisinus Abscess: Case. Mrs. B. Seen in consultation March 22, 1928, following the usual upper respiratory invasion, complicated by an acute otitis media. Left paracentesis, and in a few days, a right. The left subsided, while the right, later in developing, continued; accompanied throughout by localized mastoid tenderness far back and above the external auditory meatus. No tip tenderness, none over the site of the mastoid antrum. Very little elevation of temperature, occasional profuse perspiration, attributed by the patient to some intercurrent, trivial cause.

Seen at irregular intervals, but there was more prostration than the relatively slight middle ear discharge and low temperature warranted. Radiograph taken and reported, April 7, 1928: "Bone defect in region of superior-posterior cells, right mastoid, of undetermined origin". W.B.C. and differential taken: W.B.C., 10,150; polys., 81 per cent; small lymph., 13 per cent; large lymph., 6 per cent; dropping to 6,600, then rising on April 21 to 12,000, with 85 per cent polys. Operative interfeernce advised on the right; left completely recovered.

Transferred to Sibley Hospital, April 21, and right mastoidectomy performed; rather dense cortex, no evidence of brokendown bone or free pus on first exposure of cells near the canal, and an interne spectator walked away, apparently thinking the operation an evidence of incorrect diagnosis. Continuing upperward and outward, to site noted in radiograph and at location of continued tenderness, to pus under great tension found and in immense quantities, welling up and pulsating, and on mopping away, a large abscess was discovered.

This case made a rapid and uneventful recovery, and is illustrative of abscess found with but little destruction of the intervening bone. Organism hemolytic streptococcus.

Comment: The case briefly noted in Cuba needs no comment; one of the curiosities of Nature, possibly by generations of selection, a race might be evolved with such characteristics. The case resulting in a fatality at Walter Reed was an exceptional thing; in the course of the routine mastoid operation, an exposure was made of the lateral sinus and, following their custom, it was enlarged so that a fair portion of the sinus was uncovered. The erosion of the vein wall was due to infection and not trauma; it did not take place during the changing of dressings, but occurred hours after dressing, and while the patient was nearly, if not quite, asleep. The result of an immediate ligation of the jugular can only be open to question; personally, it would appear better to have done so the next morning. Nothing could have been lost and ligation of the jugular under procain anesthesia is not serious, is not attended by the loss of blood, would not have caused much shock, and the immediate transfusion would have been beneficial, both in increasing resistance to infection and restoration of the volume of blood.

Case 1: This patient looked decidedly sicker than the blood count or radiographs of the mastoid would justify. An exceedingly strong, robust young woman, with intense pain, headache, chilly sensations and sweats, almost from the onset. Free discharge from spontaneous ruptures, mixed infection in the smears, later cultures from lateral sinus pus, showed hemolytic streptococci. By most authors, the finding of pus in the brokendown thrombus is considered an indication of a higher mortality. In this case, and in all of the others except Case 4 and the case at Walter Reed, brokendown clot and liquefied pus were found, and all recovered except those two cases.

Cases 2 and 3: Present many points of similarity, about the same age, 8 to 9 years, and same build. Both had been going on for a long time, both exceedingly deaf, and both made slower recoveries than the rule. In Case 2 the ligation of the jugular by Dr. Bailey under procain anesthesia shows what can be done under local anesthesia in these severe cases. Anesthetic time is cut down and operative risk is minimized.

Case 4: Unusual case from the onset. Patient looked very anemic, had been treated palliatively as long as possible, because of the persistence of the chest symptoms. Throughout the course of the disease there was more than usual complaint of headache, especially over the right eye, and at one time the question of an accessory sinus involvement was considered in some detail and radiographs were taken of his sinuses, which showed nothing of any note. After the first operation there was no cessation of the headache, but other

symptoms cleared up and he was able to come in the office for treatment. On readmission to the hospital and operation for lateral sinus thrombosis, a considerable amount of fungoid granulations were found in the mastoid wound, though no unexplored cells; and in this regard it has been noted throughout this series of cases that the healing of the mastoid wounds have not been normal where sinus thrombosis existed. This does not, of course, apply to Case 5, which was operated a second time within a couple of days after the first operation. Whether or not this is a diagnostic point of any value in determining on which side the thrombus is situated in the cases of bilateral suppurative mastoiditis is questionable, but in this small series of cases, reparative processes have been slower on the side of the sinus thrombosis. In the event of a cerebellar abscess as a complication, the mortality is practically 100 per cent.

Case 5: Unquestionably a sinus thrombosis from the onset and the persistence of the occasional later rises in temperature cannot be accounted for, except as a limited extension of thrombosis upward or an escape of infection into the general circulation, but not enough to overcome the resistance.

The final case, that of perisinus abscess, is more or less typical of all these cases and shows the marked difference in symptoms between perisinus involvement and extension through the vein wall.

1801 I Street, N. W.

THE USE OF AYER'S SPINAL MANOMETER IN TWO CASES OF BILATERAL ACUTE MASTOIDITIS, COMPLICATED BY LATERAL VENOUS SINUS PHLEBITIS.*

Dr. George O. Cummings, Portland, Me.,

A. R., age 16 years, entered the Maine General Hospital on Oct. 10, 1927. Both ears were discharging freely and both mastoid were tender. His temperature was 105°, with a pulse of 110, and a respiration of 25.

Seven days before his admission he had had an acute tonsillitis, the next day his ears had begun to ache and the following day to discharge; he also had some bronchitis. His condition became worse and the pain about his mastoids increased.

Examination after admission showed a bilateral acute purulent otitis media, with tenderness over both mastoids, more marked on the left. He still had a pharyngitis and some cough. X-ray of the mastoids showed them both to be affected, but that the left was the more involved. His white count was 15,000, with 86 per cent polymorphs. The hemoglobin was 76 per cent. Smears from the ears showed staphylococcus.

In view of the high temperature, the acute purulent otitis media, and the otherwise negative physical findings, it was felt that he must have a lateral venous sinus phlebitis; but in which lateral sinus?

On Oct. 21, as the left mastoid seemed the more involved, it seemed best to operate on it. Under gas anesthesia a complete left mastoidectomy was performed. The mastoid was of a small cell type, narrow and deep. There was granulation tissue throughout, with little pus. An area of necrosis led to the lateral sinus, which appeared whiter, thicker and less elastic than normal. The sinus was not explored, as we were not certain concerning the other ear.

For the next two days his temperature ranged from 102° to 105°, with a pulse of 90, and a respiration of 28. There was absolutely no evidence of meningitis. He was seen daily by the medical service, who detected a little moisture in his chest, but did not feel that it was enough to account for his temperature. X-ray of the chest

*These cases were presented at a Clinic of the Cumberland County Medical Society.

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revealed no pneumonic process. Culture from the mastoid showed a staphylococcus. The laboratory reported a staphylococcus in the blood culture but felt that it might be a contamination. The Wassermann and Widal were negative. There was no evidence of typhoid bacilli in stools or urine. The white count dropped to 12,500. The other ear discharged less and the mastoid tenderness decreased.

On Oct. 24 he was given a transfusion of 250 c.c. of whole blood. His hemoglobin had dropped to 55 per cent, and his white count to 8,500. That evening his temperature dropped to 100° but the following mornings it had risen to 104°, when we decided to do a spinal puncture and use Ayer's manometer. After the spinal puncture needle was in place and the manometer attached, the fluid rose to 210 water m.m.—a pressure within normal limits; on compression of the jugular vein on the left, the operated side, the fluid rose to 300 water m.m. very slowly; on compression of the right jugular vein the fluid rose quickly to 350 water m.m. We felt that these procedures indicated a partial blocking of the return venous flow through the left internal jugular, suggesting a mural thrombus partly obstructing that sinus. The spinal fluid itself was not under pressure and was normal to laboratory examination.

On Oct. 26, as his condition had not changed for the better, it seemed best to explore the right mastoid, to be doubly sure that the right lateral venous sinus was not affected, and then to cut and tie the left internal jugular and to obliterate the left lateral sinus.

The right mastoid was rather diploic in type, narrow and deep. There was a quantity of granulation tissue and pus. The sinus plate was thick and intact, so that it did not seem necessary to expose the sinus. The dura was not exposed. It appeared that the infection in the mastoid would not have resolved without operation. The left internal jugular was then cut and tied above the facial vein. The left mastoid wound was then reopened, the sinus further exposed, opened and packed. The sinus wall was fully 3/16-inch in thickness. There was free bleeding from above. The condition of the sinus strongly suggested a mural thrombus.

During the next three days his temperature ran a septic course, varying between 102° in the morning and 105° at night. The second blood culture was reported negative, the hemoglobin dropped to 50 per cent, and the white count to 6,800.

On Oct. 28 he began to complain of pain in the right wrist and left ankle. There was some redness about both joints and they were tender to pressure.

On Oct. 29 he was given 7 c.c. of 1 per cent mercurochrome intravenously, following which his temperature dropped to 102° at night but continued, as before, on the following day.

On Nov. 1 he was given another 7 c.c. of 1 per cent mercurochrome intravenously. His temperature was reduced that evening but the next day resumed its course. This dose was followed by loose bowel movements and some salivation.

During the next four days his temperature gradually dropped so that its high point was 103°. His hemoglobin was 51 per cent, white count, 7,400, with 75 per cent polymorphs.

On Nov. 4 the abscesses which were developing about the wrist and ankle joints were opened. X-ray revealed no actual involvement of the joint structures.

In course of the next four days he lost ground, although the high point of his temperature dropped to 101°.

On Nov. 8 he began to develop an abscess on the right thigh.

During the next two weeks he steadily lost ground. His temperature ran irregularly between 99° and 101°.

On Nov. 23 an abscess formed in the middle of his back, which developed into a bed sore. His condition was pitiful; he was reduced to skin and bones, and was semidelirious a good part of the time.

On Nov. 25 he was given a transfusion of 250 c.c. of whole blood. The next day he seemed far better. His hemoglobin and red cells, which before the transfusion had been 50 per cent and 2,478,000, respectively, rose to 60 per cent and 2,800,000. He continued to gain and on Dec. 2 was given a second transfusion of 250 c.c. of whole blood. From this time his recovery was assured. After his temperature had become normal he was given general treatments with the Alpine sun lamp, which materially aided the healing of the bed sores, that had resulted from the abscesses on his hip and back.

The orthopedic service attended to the ankle, wrist and back, and under their careful guidance he was able to be discharged from the hospital on Apr. 1, with no deformities, despite the extensive abscesses which had involved the tissue about certain joints.

Jan. 21, 1928, H. P., age 11 years, a deaf mute, entered the Maine General Hospital. Prior to his admission he had been ill with an upper respiratory infection for three days. His past history showed that he had had a left mastoidectomy performed in 1925.

On admission his temperature was 105°, pulse 140 and respirations 40. As there was some moisture in his chest, a tentative diagnosis of bronchopneumonia was made. His white count was 37,000. His urine was loaded with albumin and red cells.

During the next five days his temperature gradually declined, the albumin in his urine decreased, and he passed an adequate amount of urine. He appeared sicker than his temperature and kidney condition would warrant. He began pointing toward his ears and there was tenderness about his mastoids.

Feb. 2, nine days after his admission, his eardrums appeared pale, very slightly bulging, with pus definitely behind them but not under much pressure. A bilateral myringotomy was performed. In course of the next few days, despite the fact that both ears were discharging freely, his temperature rose to 102°, and the tenderness about the mastoids increased. Cultures taken at the time of the myringotomy proved to be staphylococcus albus. His white count was 17,600, red count 2,850,000 and hemoglobin 60 per cent. His heart, lungs, abdomen and reflexes were negative, as was the X-ray of the lungs, Wassermann and Widal. Examination of his stools and urine revealed no typhoid bacilli. In view of these findings and the fact that he appeared sicker than he should have from his mastoid alone, it was suspected that he might have a lateral venous sinus infection. If so, which one?

The left mastoid was the more tender and the X-ray pictures, apparently, showed it to be the more broken down. The films were difficult to interpret, as three years before a mastoidectomy had been performed on the left side.

On Feb. 6 he was taken to the operating room, where a spinal puncture was performed and Ayer's spinal manometer attached. The fluid rose to 220 water m.m., a normal level. Pressure on the right jugular vein shot the fluid up sharply to 360 water m.m., while compression of the left jugular vein did not affect the level of the fluid at all. This appeared to confirm our suspicions that there was a sinus phlebitis and that the left sinus was not only affected but was no longer patent.

The left mastoid, apparently the more affected, was then opened. The mastoid was large, cellular and deep. Many cells were opened that seemed to have been overlooked at the previous operation. There was much granulation tissue throughout the mastoid but little pus. An area of necrosis overlaid the sinus, which was widely exposed. It appeared whiter, thicker and less elastic than normal. In view of the patient's condition it did not seem wise to open the sinus, or cut or tie the internal jugular at that time.

For the next three days his temperature remained between 103° and 104°. His white count rose to 23,000. Tenderness over the

right mastoid decreased and the aural discharge diminished. Blood cultures were negative.

On Feb. 9, as he was not gaining ground, the left internal jugular vein was cut and tied above the facial vein. The left mastoid wound was opened and the lateral venous sinus further exposed. On opening the sinus there was free bleeding from the extreme upper end. The sinus wall was much thickened and diseased, and there was evidence of a clot below.

In spite of these procedures and the fact that his right ear was clearing up, he continued to run an irregular septic temperature.

Feb. 12 he was given a transfusion of whole blood. That evening his temperature dropped, only to rise again the following morning.

Feb. 17 he was given a second transfusion of 250 c.c. of whole blood, followed by a temporary drop in temperature.

During this time he appeared desperately ill and was at times irrational. His urine showed but a trace of albumin, his white count dropped to 8,500 and his hemoglobin was 50 per cent. The transfusions had not seemed to help him, so we turned to mercurochrome. From Feb. 19 until Feb. 29 he was given 3 c.c. of 1 per cent solution of mercurochrome intravenously every other day. After the first two doses he began to pick up, although he still ran a temperature that rose to 101° at night. In endeavoring to discover the cause of the persistence of the temperature it was felt the other ear could be ruled out, as could the throat and sinuses. His heart and lungs were negative to examination and to X-ray. There was no gastrointestinal condition. As his wound was dressed, pus was noted coming from the bulbar end of the obliterated sinus. A small rubber catheter was passed toward the bulb as a drain. This apparently drained the focus that was keeping the temperature above normal.

His condition continued to improve and by Feb. 27 his temperature was normal and he began to gain. His convalescence was hastened by the general ultra violet lamp treatment, and was uneventful except that there was delayed healing in the wound, which neither curettage nor sliding skin flaps across the wound remedied. Stimulation of the refractory tissue was accomplished with the water-cooled ultra violet lamp, placing the quartz rod in the depths of the wound.

47 Deering Street.

TWO CASES OF NASOPHARYNGEAL FIBROMA TREATED BY OPERATION AND FOLLOWED BY RADIUM.*

Dr. A. H. Persky, Philadelphia.

I wish to present my apologies for wishing to add to the already over-abundance of literature on this rather unusual condition. For although it is comparatively rare, yet the surgical treatment dates back to the time of Hippocrates, according to Crowe and Baylor[1]. Still, Milligan[2] quotes certain British otolaryngologists who have never seen a case of nasopharyngeal fibroma in a period of 30 to 40 years of practice—and yet, there seems to be a considerable number of cases reported in this country, and at the risk of repetion I wish to present two cases that occurred in Dr. Ersner's practice within one month of each other.

Dr. Coates[3] in 1917 very carefully summarized the then-prevailing views on the subject and I shall take the liberty of repeating a few of the major features.

Firstly, the growth is usually single. Occasionally a rare case of multiple growths has been reported. There is a great deal of doubt as to the pathology of these multiple growths. More frequently they are "polypoid fibromas" or a "fibromatous polyp". Coates'[3] case was one of the very few reported where the pathology of multiple growths was a true "fibroma".

Goldsmith[4] also reported a case of multiple fibroma, but this diagnosis pathologically was "polypoid fibroma". While clinically it is a question of splitting hairs as to whether a growth is a true fibroma or a fibromatous polyp—as the symptoms presented by each are similar; pathologically there is a definite difference. It has been shown that the fibroma more frequently arises in the nasopharyngeal recess, while the softer fibromatous myxoma, or "polyp", as it has been referred to, more likely arises in the nasal cavity and extends into the nasopharynx. On this point Hall[5] summarizes that a true fibroma is a rare tumor springing from the dense fibrous tissue covering the nasal processes of the occipital bone, foramen lacerum mediale, the under surface of the sphenoid, the first cervical vertebra or the sphenopalatine recess. Wall[6] forms two classifications: 1. An in-

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trapharyngeal type arising from the basilar fibrocartilages of the upper cervical vertebra, or the internal lamina of the pterygoid process, and grows forward into the nares and adjacent sinuses. *2.* An extra pharyngeal, arising from the anterior lacerated foramen or the sphenopalatine fossa. Milligan[2] classifies the origin of nasopharyngeal fibromata as: *1.* The wall of the nasopharynx. *2.* The lateral wall in front or behind the Eustachian cushion. *3.* The Eustachian cushion itself or the orifice of the tube. *4.* The posterior surface of the soft palate. *5.* The various sutural lines. *6.* The adjacent accessory sinuses. *7.* The pterygomaxillary recess. He thinks that they are fibrocartilaginous in origin, and as the sutural lines tend to ossify, so do these growths cease to form and become recessive. Those most amenable to surgical interference spring from the vault, from the mucoperiosteum of the basosphenoid, and especially those possessing a pedicle, even if it be a short, stout one. The more posterior the point of origin is situated, the harder and firmer the growth, and vice versa, the more anteriorly it is found, it is more likely to be softer and more polypoid. It is noteworthy that the above views are not accepted by all workers. Herbert Tilly[7] thinks that most of the growths are "post-nasal", in that they spring from the sphenoethmoidal recess rather than the vault of the pharynx. Ucherman[8] also believes that the insertion is usually, if not always, from the face of the sphenoid and the sphenoethmoidal recess, the tumor spreading into the nasal chambers, accessory sinuses or into the nasopharynx, and that all other attachments are secondary, or due to adhesions.

There seems to be a general consensus of opinion that the growth is limited to males between the ages of 10 and 25. Why the neoplasm should show a preference for the male sex is something that I could not discover in a very careful search of the literature.

Because of a sporadic case in females reported, Getchell[9] has made a study of these cases and feels that they are perhaps more inclined to be a nasofibroma and not a true nasopharyngeal neoplasm. Bench has advanced the thought that it may be due to the fact that the growth of the bony skeleton of the skull comes to an earlier standstill in woman than in man. New and Figi in their interesting series at the Mayo Clinic include four females in their series. Still, I shall repeat, there is no apparent cause for its preference for the male sex.

As to the age limits, Milligan holds that, due to the ossification of the sutural lines, there is a subsequent atrophy of the growth. Here, also, there is no satisfactory theory for this occurrence, yet almost all observers have stated that there is general tendency of the growth

to atrophy about the of 25. Only a rare case has been reported past this age limit.

Another characteristic of this tumor is the tendency for recurrence, especially after incomplete removal. It does not metastasize nor does it undergo sarcomatous degeneration. It is usually composed of fibrous tissue with large cavernous blood spaces, especially near its attachments and near the periphery. It grows by extension and invades the orbit, the accessory sinuses, the pterygoid and temporal fossa or the intracranial cavity. As the fibroma grows it becomes attached to the soft parts with which it comes in contact, and thus derives an additional blood supply. Often a growth may be found to have several attachments and the arteries that enter it may be as large as the external carotid. From this it can be seen that a great danger may be incurred if the growth be permitted to atrophy on its own accord, and why surgical interference is imperative at as early a date as possible. Occasionally the above characteristics render surgical treatment very dangerous if we delay too long.

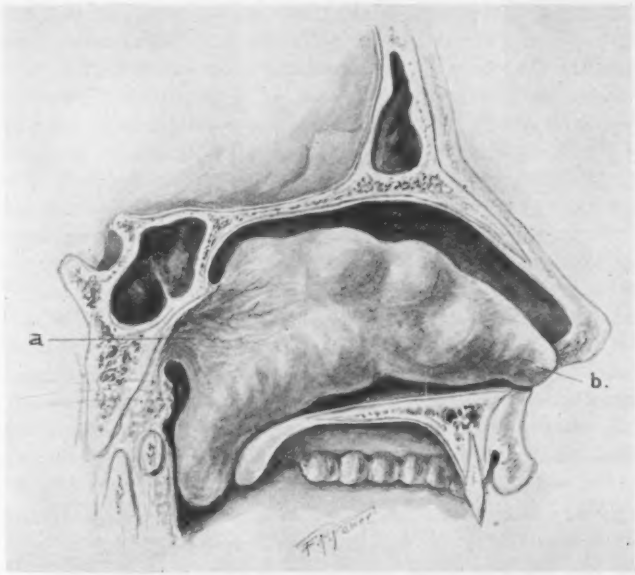
I shall not attempt to go into detail as to the various methods of treatment for this apparently benign neoplasm. I shall only mention some of the earlier methods and also stress somewhat the more recent thoughts.

Various workers have used various caustics, monochloracetic acid, lactic acid, and have reported some success in the avoidance of hemorrhage. However, most of the cases reported do not follow this method. Electrolysis and the galvano-cautery have both had their innings, but unfortunately they are not applicable in all cases, nor are the reports uniformly gratifying to advocate its use. Barnes[12] reports a case where he used a specially constructed galvano-cautery snare and removed a large pedunculated fibroma in the nasopharynx and did not have a single drop of blood. The cold snare should be attempted in most cases. It is especially indicated where the mass is pedunculated and rather soft at its attachment. Its great ease of application in the suitable cases makes it rather a desirable method in all cases. This must always be applied at the very base of the attachment of the mass, otherwise we are prone to have rather extensive bleeding and later may have recurrences from the remaining fragments. Where the mass has a very broad base, and it is too hard to be cut by the cold snare, it may be possible to avulse the entire mass by grasping it with a heavy adenoid punch, as Coates has used in his case or as Sir St. Clair Thomson[10] indicates the use of a Lubet-Barbon forceps. The mass is grasped very firmly with this instrument and, gently rocking it for as long as five minutes, it can

be entirely worn away from its attachment. It is a noteworthy fact that there is comparatively very little bleeding and rarely a recurrence of the growth.

The use of the very radical methods, such as splitting the palate, and the various external operations, are only mentioned to be condemned. The mortality is very high and most men today use the other means at hand.

The more recent thought is the use of radium, either as a salt or the emanation. Crowe and Baylor[1] in their excellent paper have



Large fibroma in nasopharynx visible through the mouth, just protruding from under the soft palate, attached to the spheno-ethmoidal recess on the left side. Easily removed by the cold snare. A, soft, congested and more elastic; B, pale, hard and fibrotic.

used extensive treatment both by emanation and gamma rays in four cases with a complete cure and no recurrence in two. Milligan[2] in his case used the radium emanation, using 12 to 18 tubes directly into the mass. Dahney[11] used radium directly applied through the anterior nares. He had to reapply this as a small mass was still present six weeks after the initial application. Keith[13] used four radium needles, each 12½ m.g., inserted directly into the growth, about 1 c.m. apart and left in place for 12 hours. Another radium

capsule was inserted into the post-nasal space. In addition he used extensive deep X-ray radiation. After two months this growth had entirely disappeared. New and Figi[14] reported an interesting series of cases. They describe three methods that they have used. *1.* A large tube or capsule containing 50 m.g. of radium applied directly to the nares for 10 to 15 hours. *2.* The use of steel points containing the radium emanation; or *3.* the element inserted into the tumor. The treatment was repeated in six weeks or two months. The number of treatments per case ran from two to nine. Their report of the number of cured cases and without recurrences is very encuraging. Parish and Pfahler[15] also report the use of radium in a case. However, this case not only received a preliminary bilateral ligation of the external carotid and surgical removal of the growth, but also extensive X-ray treatment.

I wish to cite two cases that I had the privilege of studying with Dr. Ersner within a month. *Case 1:* Ralph I., age 10 years, was brought to see Dr. Ersner because of difficulty in breathing. The breathing was rather periodic in character; that is, at certain times he was perfectly normal and did not have any impediment, but at other times he could not breathe through his nose. Often he was so distressed that he could not sleep. One day his father discovered a mass in the child's mouth and brought him in for treatment.

He was a well developed child and presented nothing other than a peculiar appearance about the face, the adenoid facies. General examination did not reveal anything of importance. Examination of the mouth disclosed a pale nodular mass protruding down below the soft palate. On palpation it was found to spring from the nasopharynx and was very firm and hard, yet it had a definite pedicle.

The past history is irrelevant, having had measles, mumps and chickenpox. He had T. & A. two years ago.

He was admitted to the Graduate Hospital. A general anesthetic was administered and with a snare the entire mass was removed from its site of attachment. There was no difficulty in cutting through its attachment as this was rather soft. There was some free bleeding, but it was not very alarming. Under a post-nasal pack and hard against the sphenoid bone, where the mass was removed, a leaded tube protected with rubber, containing 25 m.gm. of radium, was placed. Another tube containing 25 m.gm. was inserted through the nose. This was left in place for 12 hours. There was only a slight reaction, but we noticed a rather profuse discharge for several days. There was no further bleeding and the child was discharged from the hospital several days later, apparently symptomless.

Twelve days later he received another application of radium, 50 m.gm., for six hours.

In the accompanying illustration, you will see two views of the mass. You will note that the pendulous portion was nodular, hard, pale and fibrotic. On the other hand, the portion near the line of attachment was somewhat congested, softer and composed of more elastic tissue. There was no evidence of a polypoid nature of the mass.

The second case was Carmine C., a boy, age 15 years, who complained also of difficulty in breathing. About six years ago the patient had an operation for what was thought to be an adenoidectomy. Four years ago a second operation was performed for this growth. One year ago the lad had a growth removed from his nasopharynx and was to return for a secondary operation. On examination, Dr. Ersner found a hard mass protruding into the left nostril and also what appeared to be a mass protruding below the soft palate. A diagnosis of nasophayngeal fibroma was made and the boy was admitted to the hospital for operation. Under a general anesthetic and with a snare, a large mass was removed through the nose. Another mass about the same size was removed from the pharynx. Three other small masses were found attached to the choana and left Eustachian orifice with a small mass that seemed to come from the Eustachian tube itself. These were all avulsed by a heavy adenoid punch. All the growths together were about the size of a lemon. After the removal of the masses, it was noticed that the entire septum was forced over to the right—almost completely occluding the entire right nares. As there was considerable bleeding, a post-nasal pack and another pack in the nose was inserted. This was removed in 24 hours. On the third day 25 m.gm. of radium were inserted in the post-nasal space hard against the sphenoid. This was left in place for 12 hours. This was also followed by a great deal of purulent discharge. Twelve days later he received another application of radium in a similar manner but this time it was 50 m.gm. for only six hours. In this case, as also in the former one, it was noticed that he developed a nasal twang, which disappeared in about 10 days.

The general appearance of the mass seemed to conform to the natural orifices of the nasopharynx and the accessory growths were probably recurrences from his former operations, and not multiple growths.

In conclusion, there are certain features of this unusual condition that I feel are worthy of mention, *1*. The occurence of two cases

within a month having the usual classical features as to site of origin, the sex and the age of the patients. *2.* The use of the snare and adenoid punch in its removal per via naturalis. *3.* The general trend of the profession toward the use of radium, in its various forms, either as an adjunct to a previous surgical removal, to prevent recurrences or alone by repeated treatments causing a regression of the growth. *4.* There was no evidence of any cartilaginous or bony destruction due to the radium. *5.* The profuse nasal discharge was evidently due to reactive processes of the operation of the nasal packs and the radium; and usually subsided in about two to three weeks. *6.* Examination of both patients eight months later failed to show any evidence of recurrence in either case.

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3109 Diamond Street.

IMPLANTATION OF RADIUM SEEDS IN MALIGNANCY OF THE MOUTH, THE NOSE AND THE ESOPHAGUS.*

DR. FRANK RICHARD HERRIMAN, New York.

In all the malignant lesions I am showing here tonight there are a number of points in common beside the method of treatment. I especially wish to emphasize the fact that all the patients were in such an advanced stage of the disease that they were beyond any hope of aid from surgery before they came under my care. In every case the general physical condition was poor and the patient suffering great mental depression. Most of the lesions had so interfered with the regular ingestion of food that he was practically facing starvation. The reduction from normal weight was always striking, one patient being 50 pounds below his usual weight, which constituted a loss of almost one-third.

The method of radium implantation which has been employed has other advantages beside the possibility of being effective when all other means have failed. Its immediate effects are extremely rapid, and because of this, its effect upon the patient's *morale* is very great. Those who at the commencement of the treatment were quite hopeless, become bright and cheerful within a week; appetite returned with the possibility of once more ingesting food in a normal manner, with a consequent gain in weight and strength. The increase in weight I consider the most reliable index to the general condition of these patients, particularly when the lesion is in the larynx or esophagus.

External lesions, such as metastatic glands, can be dissipated in from six to 10 days. The less accessible growths cannot of course be so readily handled. Most of the larynx and esophagus cases which come to us are nearly *in extremis,* being often unable to swallow water even. I regret that I have no esophagus cases to show tonight. There are two, both patients unfortunately living out of town, who have now gone more than a year since implantation, are able to eat and live a relatively normal life and—what seems to me of especial importance—are receiving no medication of any kind.

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*Read before the New York Academy of Medicine, Section of Laryngology and Rhinology, Jan. 23, 1929.

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I would like to stress particularly the value of radium in affording relief from pain and doing away with the necessity of "doping" these patients. The continual administration of morphin, as you all know, results in rapid mental deterioration, which is by no means the least distressing feature of many of these cases. If radium gave no benefit other than this I should regard it as abundantly worth while. It actually increases the patient's moral courage, instead of destroying it, as anyone who has watched the progress of one of these radiated cases can testify.

We are much hampered in our study of these lesions because so many of the patients are lost to sight, so that the final results are never recorded. If it were possible to hospitalize them under suitable conditions, not for days, as we must do now, but for years, so that every feature of the condition could be watched throughout, we could make far better progress with our therapy than is at present possible. It would then be easy to control diet, to remove all foci of infection in the mouth or elsewhere, and to approximate sterilization of the areas involved, such as is at present out of the question.

The technique of radium application should be studied with the same thoroughness one would apply to the mastering of the details of a new surgical operation. Upon the anterior surface of the tongue it is a relatively simple matter, but as we go further down, particularly in the larynx or esophagus, the lesion becomes progressively more inaccessible, and the details of implantation more difficult to carry out. In the larynx suspension laryngoscopy gives us a very fair exposure, so that the seeds can be placed so that the radiation is equally distributed. This is of importance in contrasting the method of redium implantaion used here with the needles or "block" applicators which have previously been used in the larynx and esophagus. No matter where the lesion is located, it is essential that the operator visualize clearly the extent of the mass with which he is dealing, and estimate the amount of radiation necessary to reach every part of it, so as to administer adequate dosage.

The handling of the lymph glands of the drainage area is of particular importance in all intraoral lesions. In all but one of the patients shown here tonight, extension to the submental and cervical glands had taken place before the patient came under our care. Early metastasis is the rule in cancer of the tongue, so that the state of the glands is almost equal in importance with the condition of the primary lesion. This glandular metastasis can be controlled by radium implantation. Even when the mass is still palpable there will be decrease in size and no further extension of the metastatic process.

The effect of radiation upon these glands has been extensively studied in excised specimens. The cell-structure of the neoplastic growth is often completely changed. Beginning as a swelling of the protoplasm of the cell, the nucleus becomes thickened and more dense; then the cell shrinks and eventually disappears altogether, its place being taken by dense fibrosis, much in the manner of replacement by cicatricial tissue. This fibrotic process is not to be confused with the formation of scar-tissue after necrosis and sloughing, such as is induced by the use of unfiltered radium. Thus radiated glands may still be palpable, although all mitosis has been inhibited. When secondary infection has complicated the original lesion we have a process of healing such as follows the resolution of any ulcerated surface. But this, too, is distinct from the fibrosis induced by gamma radiation.

Fibrosarcoma of Right Naris: Boy, age 9 years, struck by automobile three years ago, causing skull fracture. Bad "nose bleeds" ever since. Examination, Sept. 7, 1928, showed large growth protruding from right nostril; ethmoidectomy, resection of growth for present in right naris; one radium seed implanted, excision of growth advised. Jan. 19, growth removed, five radium seeds implanted in site. The seeds were removed Jan. 31. General condition of patient much improved, but polypoid materials must still be removed from the nose and radium applied to site of growths. Tonsillectomy has been advised.

Squamous-cell Epithelioma of Tongue and Floor of Mouth: Male, age 52 years, treated by radium in October, 1927, for a small ulcerated tumor on left border of tongue; result good. In August, 1928, patient returned with a new lesion on the right anterior border of tongue; submental and cervical glands palpable. The patient smokes a pipe, takes alcohol moderately; Wassermann negative. Radium implantation was advised at this time, but the advice was not acted upon. Four and a half months later patient again appeared, this time with marked induration and ulceration of entire anterior third of tongue and involvement of the floor of the mouth. Examination showed broken and decayed teeth; an indurated mass 1 inch in diameter in right submixallary region, and a hard, swollen nodule in left cervical region. Pathological report, squamous-cell carcinoma. On Dec. 15, 1928, 10 radon seeds were implanted in dorsum of tongue, border of tongue and floor of mouth; three seeds in right submaxillary mass and two in left cervical mass. Seeds removed Dec. 26. At present the condition of the tongue is markedly improved; its appearance is beginning to be normal, is more freely

movable; little pain; speech improved; eats better. The submaxillary and cervical masses are still palpable, though smaller. They are still hard.

Carcinoma of the Epiglottis: Male, age 60 years, has been hoarse all his life; formerly alcohol in excess, smokes and chews tobacco. Only for past four or five weeks pain and difficulty in swallowing; has lost 25 pounds. Examination showed teeth diseased; submaxillary glands bilaterally enlarged; large cauliflower mass over left margin of epiglottis extending over its laryngeal surface. On Oct. 4, 1928, under suspension laryngoscopy, six radon seeds were implanted in the larynx and two in the glands. The patient has now gained 18 pounds in weight, and though some difficulty in smallowing persists, the general condition is much improved.

270 Madison Avenue.

RECURRING STRICTURE OF THE ESOPHAGUS DUE TO EPIDERMIDOLYSIS CORROSA.*

Dr. Philip S. Stout, Philadelphia.

Daniel S., age 50 years, came to me in October, 1926, with the following history: Three days after birth he developed what he still has, a strange skin affection, which was diagnosed as Pemphigus Vulgaris (Duhring), Epidermolysis Bullosa (Stellwagon) and Epidermidolysis Corrosa. This affliction has affected his mucous membrane as well as the surface skin and nails. At the age of seven he became conscious of the fact that he had difficulty in swallowing. When he was age 21 years he had so much closure of his esophagus that he was unable to swallow any solids and his diet became practically liquid. He went to a hospital in this city and there, using considerable force, they pushed through a rather large-sized, olive-tipped esophageal bougie. This gave him great discomfort and considerable bleeding. They followed this up by a number of other bougienages until he seemed to have a fairly good swallowing capacity. However, the stricture, or strictures, again formed slowly and

*Read before the Philadelphia Laryngological Society, Feb. 5, 1929.
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at the age of 50 years it was almost completely closed, when he came to me for treatment. He was so bad that at times he could not swallow his own saliva; he would try and try again and finally would have to expectorate it. At that time I found him considerably run down, having lost weight and strength and he was indeed in need of immediate relief. The first time he came I was able to get a small, olive-tipped bougie into the stricture, but I do not think it went through; however, he seemed to be able to swallow a little better after that treatment. By weekly treatments over a number of months I gradually got it so that I was able to pass a large-sized tip through both strictures. There seemed to be two strictures, one below the other, at the level of the larynx. X-rays did not seem to give very much information. He tells me now, after two years, that he has gained in weight and strength and feels better than he has for many years and can swallow better than he has ever been able to do as long as he can remember.

This is one of those unusual cases that we meet very occasionally, in that it is impossible to use a pharyngoscope or an esophagoscope, since the disease has constricted the mouth so that he can open it only about half-way. Dentists have had difficulty in caring for his teeth because of his inability to open his mouth. I take great pleasure in presenting this patient to you this evening.

Medical Arts Building.

ARTHUR HENRY CHEATLE.

Arthur Henry Cheatle died in London, England, May 11, 1929, at the age of 63 years. Mr. Cheatle was Oral Surgeon to the Kings College Hospital of London and was internationally known for having won the Adam Politzer Prize at the Ninth International Otological Congress and for his pioneer work in explaining the structure of the mastoid. For a period of many years he gathered a famous collection of specimens and preparations of the mastoid to show the influence of sex, age and individuality in health and disease.

In 1913, he was President of the Otological Section of the International Congress of Medicine.

The loss of Mr. Cheatle will be felt not only by British otolaryngologists but by his colleagues throughout the world.

FINEBERG, *St. Louis.*

International Digest of Current Otolaryngology.

Editor:
Dr. Maxwell Fineberg, St. Louis.

Collaborators:
Mr. W. S. Daggett, London.
Priv. Doz. Dr. G. Keleman, Budapest.
Dr. D. E. Staunton Wishart, Toronto.
St. Louis Jewish Hospital E.N.T. Journal Club.

Precechtel, in the Journal Otolaryngologie Slavica, Vol. 1, Fasc. 1, January, 1929, presents a very interesting paper entitled, "Hypotonic Degeneration of the Labyrinth in the New-Born".

In 1923, the author published nine cases of infants, all of whom had been in abnormal intra-uterine position, who showed static disturbances during the first post-natal years, such as retarded sitting, standing and walking. In eight of them, vestibular reactions were tested and it was found that the reaction after rotation was preserved but that the caloric reaction was either considerably weakened or absent. In one case the function of the labyrinth was entirely negative.

In the present paper the author gives the histological findings in the internal ears of two babies, both of whom had been in an abnormal position during the fetal period. In one, the right temporal bone, and in the other, both labyrinths were removed. In the first case there was hypotonic degeneration of the labyrinth to an advanced degree with the free wall of the sacculus defective. In the second case, in the left labyrinth there was degeneration of the wall of the sacculus; in the right, complete degeneration of the labyrinth with the wall of the sacculus defective.

Wittmaack regards the histological changes (1) in the organ of Corti in these cases as hypotonic (or intravital) and post-mortem which are, however, distinct from the former. (2) There were synechiae between Reissner's membrane and the membrana basilaris. Evidently also the defect in the wall of the sacculus was due to an hereditary degenerative constitution.

The author believes that the labyrinth participates in regulating the position of the child in the uterus and that labyrinthine changes may produce pathological positions of the fetus. In these cases we have to assume that the labyrinth at first developed quite normally and underwent secondary degeneration very early during fetal life.

Philip Frank, *St. Louis.*

Cavengt, in Pediatria Espanola, September, 1928, reports a case of scarletinal angina. A child, aged three, had a very severe attack of scarlet fever which followed a normal course. During the first 36 hours the characteristic erythematous angina appeared. Both tonsils were enlarged and the posterior palatine region congested and thickened. Another physician was called on the case and, assuming that abscesses were forming behind the tonsils, he attempted to open them. Fourteen hours after operation a marked necrosis occurred; after this serotherapy was instituted. The child's condition continued to grow worse and it died. FINEBERG, *St. Louis.*

Harnick, in the Canadian Medical Association's Journal, May, 1929, reports on the treatment of chronic otorrhea with Calot's solution. He states that the ear should be cleansed of all serous matter that may be present and about 5 to 10 drops of the solution instilled into the canal of the infected ear. Tragus massage is employed to get the disinfectant fluid into the Eustachian tube. This procedure is carried out every night for a week and nothing else is done. The secretion will change to a thin serous nature and become markedly reduced in quantity, after which boric acid powder insufflation is used. FINEBERG, *St. Louis.*

Crume, in the Texas State Journal of Medicine, April, 1929, writes of an interesting anomaly of the cranial cavity. A woman stated she had had mastoiditis in 1921 with recovery, another attack in 1925 with only partial recovery. Since then she had continued to have some pain and tenderness over the tip of the mastoid bone. She gave no history of ever having had a purulent otitis media. The Roentgenogram showed a shadow in the occipital region just back of the mastoid, which was suggestive of intracranial abscess. When Crume operated he found nearly all of the cells obliterated with extremely hard bone; no pus or granulation tissue was found and no sinus leading from the mastoid cells to what he thought might be a brain abscess. An absolutely empty cavity about 2½ inches in diameter was found. Crume's theory is that at some previous date an injury was received, causing a fracture of the skull and producing an intracranial hemorrhage. The blood clot became encapsulated and was finally dissolved, leaving the capsule as shown in the Roentgenogram. The patient returned home in a few days after the operation and the last report from her was that she was improving and greatly relieved of the pain from which she had so long suffered.

FINEBERG, *St. Louis.*

Peters and Allison, in The Lancet for May 18, 1929, investigated possibility of producing immunity to scarlet fever by the application of scarlet fever toxin to the nasal mucous membrane. The nose is first sprayed with a solution of 1 per cent sodium taurocholate and then the toxin used by means of an atomizer. The author suggests spraying twice a week for eight weeks. This method is free from the objections of innoculation and does not produce any disagreeable effects of the disease except the development of immunity in a considerable portion of cases. FINEBERG, *St. Louis.*

Balyeat, in the Southern Medical Journal, May, 1929, reports his studies of 441 cases of perennial hay fever. Most of his patients reacted to some pollen or other, either on intradermal or dermal tests. Balyeat concludes that at least 80 per cent of the patients suffering from perennial hay fever have been misdiagnosed and treated for primary nasal diseases or some other condition. Many of these patients have had much needless surgery performed on them.
FINEBERG, *St. Louis.*

Dr. Albert A. Gray has been awarded the "Guyot" Prize by the University of Gröningen for his research on diseases of the ear.

The Eighth Rumanian Congress for Oto-Rhino-Laryngologists will be held in Bucharest, October 26, 27 and 28, 1929. For information write to Dr. Lazarus Mayersohn, Bucharest I, 81 Calea Mosilor.

Morelli, of Budapest, in the 22:189:1929 issue of Fogorvosi Szemle, writes that one must keep in mind the possibility of dental origin of the rheumatic affections. He claims that sanitation of the mouth belongs to the laryngologist as well as to the dentist and he reports numerous cases of septic character which cleared up by hygienic treatment of the mouth. Of particular note are the joint pains, so often vaguely attributed to some focus in the body. As a preliminary measure in these cases he always has the mouth put into hygienic condition. KELEMEN, *Budapest.*

I. Krepuska, of Budapest, has been appointed to investigate the question of tuberculosis of the ear for the Society for the Prevention of Tuberculosis, of Hungary. His first report, in January, 1929, contains the following notes: In superficial tuberculous diseases of the auricle, external canal and regionary lymph glands, one gets nice

results with heliotherapy. This same therapy is also of use in post-operative cases. It, however, is contra-indicated when the physical condition of the patient is low or when the process in the illness is rapidly increasing, as very often the treatment leads to tuberculous labyrinthitis or other brain complications. The therapy must be instituted early to get the maximum results. KELEMEN, *Budapest.*

Benedek and Kulcsar, in the Gyogyaszt, 635:1928, report investigations in the Neurological Department of the University Clinic of Debrecen, Hungary, in which they claim to have found a new "naso-oral reflex". This reflex was found only in pseudobulbar paralysis and it could never be found in any other pathological or healthy individual. One can elicit the reflex by percussion at the apex of the nose, striking a moderately sharp blow. The reaction shows itself in a puckering of the mouth. The percussion of the apex of the nose irritates the anterior part of the nasal supports, especially the front part of the cartilaginous wings in the perichondrium and the cartilage where the nerves are so delicate. The muscles involved are the orbicularis oris and the labial part of the facial which causes the lips to contract and form a pout. The connection between these reflexes and other known nasal reflexes has not as yet been worked out but it has been demonstrated that unilateral lesions will not produce it.

KELEMEN, *Budapest.*

The Pacific Coast Oto-Ophthalmological Society held its seventeenth annual meeting in Salt Lake City on July 1 and 2, 1929. Next year's meeting place is to be Victoria, B. C.

Officers for the next year are: President: Dr. Arthur Jones, Boise, Idaho. First Vice-President: Dr. Chester Bowers, Los Angeles, Cal. Second Vice-President: Dr. Fred T. Hyde, Port Angeles, Wash. Secretary-Treasurer: Dr. Walter F. Hoffman, Seattle, Wash.

M. Seemann, in the January, 1929, Otolaryngologia Slavica, discusses speech disturbance in myasthenia. He says that prodromal symptoms are not characteristic and hence early diagnosis is very difficult. With the exception of Freystadtl no one has called attention to the difficulty in speech during the prodromal stage as a diagnostic sign. The author has substantiated this and determined the graphic curve of this speech interference.

PHILIP FRANK, *St. Louis.*

BOOK REVIEWS.

The Nose, Throat and Ear and Their Diseases. Edited by Chevalier Jackson, M.D., Sc.D., LL.D., F.A.C.S., Chevalier de la Legion d'Honeur; Chevalier de l'Ordre de Leopold; Professor of Bronchoscopy and Esophagoscopy in the University of Pennsylvania, etc.; and George Morrison Coates, A.B., M.D., F.A.C.S., Professor of Otology, University of Pennsylvania Graduate School of Medicine, assisted by Chevalier L. Jackson, A.B., M.D., Assistant in Bronchoscopy and Esophagoscopy, University of Pennsylvania and the Graduate School of Medicine, University of Pennsylvania. Octavo volume of 1177 pages. With 657 illustrations and 27 inserts in colors. Philadelphia and London: W. B. Saunders Company, 1929. Price $13.00 net.

This work is an accumulative textbook by many known leaders in the profession, both national and international. The book is divided into three main parts. The first 400 pages are devoted to Diseases of the Nose, Throat and Sinuses; of particular interest in this part of the book is the chapter on sinusitis in children. Many new ideas are advanced and there is a complete section on Tonsilloscopy, but as yet the results to be gained by Tonsilloscopy are not quite definite. The technique of Expanded Tonsillectomy is also gone into and numerous illustrations of complete tonsillar tissue are shown.

Another part of the book has to do with the Ear. It is liberally illustrated to show pathology. Technique of operations is also very clearly shown. There are separate chapters on Syphilis of the Ear, Congenital Deafness, Anesthesia in Operations of the Nose, Throat and Ear, Operations for Cleft Palate, and on many other conditions of interest to Otolaryngologists.

The latter part of the book comprises some 450 pages and is devoted to the Larynx and Endoscopy. This section naturally contains much of the pioneer work of Chevalier Jackson. The anatomy, pathology, treatment and prognosis of the various laryngeal diseases are very carefully presented. Indications and technique in Laryngo-Fissure and Total Laryngectomy are presented and the balance of the book deals with Per-Oral Endoscopy. As is to be expected, all of the latest ideas and improvements as advanced by Chevalier Jackson and his associates are presented in this part of the book.

Jackson and Coates present this book as a textbook, compiled from original contributions of 74 nationally known authors. With such a wealth of material gathered from so many sources, we can only expect the very best in each particular branch and this textbook will very likely takes its place as a standard reference not only for Otolaryngologists but also for students and general practitioners.

M. F.

Endocrine Diseases. By William Falta, Vienna, translated and edited by Milton K. Meyers, M.D., Neurologist to the Northern Liberties Hospital; to the Lucien Moss Home, Jewish Hospital; to the Dispensary of the St. Agnes Hospital, Philadelphia, etc. With a foreword by Sir Archibald E. Garrod, K.C.M.G., M.D. (Oxon.), F.R.C.P. (London), F.R.S., Regius Professor of Medicine, Oxford University. Third edition, with supplementary notes by the Editor. (The previous editions bore the title of The Ductless Glandular Diseases.) 104 Illustrations in the Text. Philadelphia: P. Blakiston's Son & Co. 1012 Walnut Street. Price $8.50.

The book is introduced with a foreword by Sir Archibald E. Garrod in which the history of the Endocrine Glands is briefly outlined.

Anatomy, histopathology, diagnosis, prognosis and treatment of the various glands and their associations are clearly and tersely outlined, making the book not only worth while as a textbook but also very valuable as a reference.

Of particular interest to our specialty are two references. The disturbances of hearing and speech in sporadic cretinism and endemic mutism associated with cretinism.

M. F.

THE NEW YORK ACADEMY OF MEDICINE.

SECTION OF LARYNGOLOGY AND RHINOLOGY.

January 23, 1929.

Branchiogenetic Cyst of Larynx Removed by Thyrotomy. Dr. Chas. J. Imperatori.

(To appear in a subsequent issue of THE LARYNGOSCOPE.*)*

DISCUSSION.

DR. LOUISE H. MEEKER: One other case similar to that presented by Dr. Imperatori is on record and was reported by Watson. In Watson's case the cyst was found in the same location in the larynx at autopsy. The patient had been treated for six months for asthma, but no examination of the larynx had been made during life. The microscopic diagnosis in that case was "branchiogenetic cyst". Doubtless some similar cysts have been reported as diverticula. The same picture could be presented by a diverticulum with its walls folded and thickened by inflammation.

DR. T. J. HARRIS: Dr. Imperatori has included it in his paper and called my attention to the fact that some 20 years ago I reported the first case of this kind; I think it was before the American Laryngological Association. In that instance I did a thyrotomy.

DR. J. D. WHITHAM: I have had a case very like the interesting one of Dr. Imperatori. A man of 35 years came to my office complaining of difficulty in swallowing and mild shortness of breath, of several years' duration. He stated that at times something seemed to burst in his chest and he would suddenly spit up a great quantity of bad-tasting pus. This occurrence would relieve him for quite a while. He had a smooth, reddish cyst, the size of a walnut, which reached the head of his epiglottis and was freely movable. I removed it with a snare and noted that it grew from the left pyriform sinus. It was filled with sebaceous material, and microscopic examination showed an endothelial lined cyst membrane. One year has elapsed without recurrence.

DR. IMPERATORI: In the American literature, the case reported by Dr. Coakley, Transactions of the American Laryngological Association, 1904; and the case reported by Dr. Harris in 1908, THE LARYNGOSCOPE, Vol. 18, No. 8, were cysts of the lower pharynx. In fact Dr. Coakley's case was considered at one time as a chronic retropharyngeal abscess. Both Dr. Coakley's and Dr. Harris' cases were branchiogenetic cysts. Regarding Dr. Whitham's case, this was a similar one to that reported by Dr. Coakley. The case that I am reporting is one that occupied the whole half of the larynx and was part and parcel of it and there was no evidence of it in the pharynx.

Case of Squamous Cell Carcinoma of the Pharynx. Dr. Julius I. Klepper.

Literature on the subject of this type of primary carcinoma in the pharynx is rather scant. We did not find early reports of cases of squamous cell carcinoma of the pharynx. It is possible that this is due to the fact that (1) the condition is modified by an inflammatory picture so marked that the real lesion is overlooked; or (2) biopsy does not reveal the typical picture when first made, and that this is not immediately followed by other biopsies with microscopic examination.

The present case is L. T., a man of 50 years, who noticed, about four months ago, a slight pain on the right side of the neck when swallowing. A couple of weeks later he went to Dr. C.

His history showed little. Wassermann was negative. The patient indulges in moderate amount of alcohol and tobacco.

Smears made from the throat and mouth revealed the spirochetae of Vincent's angina. For the following six weeks the patient was given three salvarsan injections and local applications of silver nitrate. He showed no improvement and was then referred to us for further study and treatment.

Physical examination showed a slight tumefaction with ulcerative necrosis of the posterior pillar and adjoining right tonsil. This involvement extended also to the lateral and posterior wall of the pharynx, from the nasopharynx to the laryngopharynx and included the right side of the palate. The right tonsil was so enlarged as to be felt from the outside. No glands could be palpated. The patient complained of pain on swallowing, which extended to the ear; this, however, does not keep him from working.

It is very difficult to know what was the primary focus for this lesion. Aside from the fact that it presented itself behind the posterior pillars, one connot say whether it was primary in the tonsil extending back, or whether it extended forward from the pharynx.

As the lesion was not confined to the tonsil, and too extensive, operative procedures were not indicated. Radium treatments were then given by Dr. G. Allen Robinson.

It is of clinical importance to note that in the present case, early diagnosis of squamous cell carcinoma was not made because (1) of the presence of Vincent's angina, and (2) while biopsy with microscopic examination of the tissue were at first positive, it was later questionable. A subsequent biopsy was absolutely necessary to confirm the first diagnosis.

Negative as well as positive laboratory findings should always be substantiated by further study.

At present the patient has received radium treatments as follows: Dec. 27, 1928, 12 1.0 m.c. gold radon implants inserted into the primary growth of the pharynx. Jan. 17, 1929, an external radium pack of 200 m.g. radium applied at 3 c.m. distance for 20 hours to the right side of the neck.

He now shows marked improvement; swallows without difficulty. His tonsils have shrunk and there is as yet no involvement of the lymph nodes. An occasional sloughing warrants the use of Fowler's solution and mild antiseptics. He still keeps on working.

Clinically, this case offers two important facts: (1) that several microscopic examinations of biopsy material is of distinct advantage; (2) Vincent's angina or rather ulcerative lesions may frequently obscure the tumor. It is also interesting to note how extensive may be the involvement without the characteristic symptoms of malignancy.

The effect of radium is being carefully watched and we hope to report this case again. At present the patient shows the result of radium in only four weeks.

End-Results in Four Types of Nasal Neoplasms. Dr. Duncan MacPherson and Dr. G. Allen Robinson.

(Appears in full in the June, 1929, issue of THE LARYNGOSCOPE.*)*

Nasopharyngeal Fibroma of the Sphenomaxillary Fossa. Dr. S. L. Ruskin.

Miss E. C. began complaining of recurrent right otitis media two years ago. The middle ear did not suppurate but showed no tendency to heal. One year ago she began suffering from right hemicrania with intermittent pains darting into the face, and was referred to me for injection of the sphenopalatine ganglion.

Examination revealed hard fibromatous masses in the right tympanic cavity. There was slight facial paresis and exophthalmos, eye grounds apparently normal. The mouth aperture was restricted to about three-fourths of an inch at the incisor teeth.

Nasal examination showed a slight amount of mucopus on the superior meatus. The orifice of the right Eustachian tube approached closer to the midline than that of the left.

Throat examination revealed a dense infiltration of the hard palate extending toward the right anterior pillar. The sphenomaxillary fossa and area between maxilla and mandible were likewise infiltrated. Then radon seeds were implanted into the mass and within three weeks there occurred a distinct recession of the infiltration and a gain of seven pounds in weight of the patient.

The patient also received X-ray therapy and radium packs over the parotid region, in the mouth and in the nasal fossa. Following the first recession there has, however, occurred evidence of the extension of the neoplasm into the

sphenoidal fissure with paralysis of the third and fourth nerves and impairment of vision.

Nasofibromas have at times all of the characteristics of malignancy and this case appears to be of that variety.

DISCUSSION.

QUERY: I would like to know which of the malignant tumors is considered to yield most readily to radium.

DR. WARD J. MACNEAL: I am not sure that I can satisfactorily answer the question as to which of the malignant tumors yield most readily to radium, but our experience with radium so far would indicate two criteria for success: first, the nature of the tumor itself, about which we know something (but there are types of tumors where we feel some doubt about the prognosis); of even greater importance than the microscopic character of the tumor is its accessibility to the successful application of radium. That is the chief difficulty one meets within tumors of the nose and throat. The treatment of malignant tumors with radium is very much like killing a flea with flea powder; you must catch the flea and blow it down his throat; and if you try distant application of radium to the tumor you are not likely to get a good result.

Most of the superficial carcinomas which appear on the skin and most of the carcinomas on the mucous membranes which are readily accessible—so that one can put radium on them—are very successfully treated; 90 or 95 per cent of them may be treated with success.

As regards structured types, probably those tumors made up of a single type of undifferentiated cells yield most readily to radium, such as the prickle-cell type of carcinoma shown here. The greater the variety of cells, the greater the difficulty of treating with radium. The nature of the tumor cell is of importance, but of greater importance is the ability to put the active agent in position to act on the cell. It is evident that with a growth in the nose or pharynx, which is difficult to outline in your own minds, the application of radium to that particular growth is very difficult. We may hope that the growth will be eradicated with radium—and this does happen, for under the microscope we can see the evidence of tumor destruction—yet in many instances the growth will have extended beyond the limits of the area one can reach with radium, so that recurrence may be expected.

It must be evident to anyone who will consider the difficulties that the successful technique of the application of radium to the growth is something that is developed by experience and requires as much training and experience as that for actual surgical work. It is not a method for anyone who has access to a little radium. It requires judgment as to the extent of the growth, and how to attack the growth; the pathologist may be of some help in making the examination of the tumor and suggesting that it is one that should yield readily to radium, or that it is a type in which radium can hardly be expected to accomplish much.

DR. SMITH: What is the value of radium in application to carcinoma and sarcoma?

DR. MACNEAL: That is a difficult question. In the case of carcinoma of the skin, it is valuable. In the case of fibrosarcoma of the pharynx, for example, it is valuable. However, such a fibrous tumor of the pharynx may, after repeated surgical removal, eventually cease to recur, without any radiation at all. In lymphosarcoma you may be fairly certain the patient will die, although with radium it is possible to cause a disintegration of the tumor cells sufficiently exposed to its action.

QUERY: Better in sarcoma than in carcinoma?

DR. MACNEAL: I would not like to answer that question. There are so many different kinds of sarcoma and of carcinoma.

DR. W. M. CAMERON: In regard to radium application, I think we might add a little to what Dr. MacNeal has just said. As a general rule, any tumor growing rapidly and also having a good blood supply will yield readily to radiation. That does not always mean a cure, but as for controlling the lesion, you do better with an application of radium than with surgery. Lymphosarcomas are very susceptible to radiation, yield very rapidly; but in two or

three years there will be a recurrence at some other point. The life extension period, however, is longer with radiation in the rapidly growing tumor.

Then the location of the tumor has a lot to do with radiation. If the tumor, without regard to the cell structure, occurs in the lymphoid tissue of the tonsil, for instance, we find we get a very nice result—primarily, in the sarcomas; whereas they will not yield so readily in the antrum.

I wish to call attention to a new method of applying radium in large amounts to glands of the neck. I have been using a 2-gm. pack (much more than has commonly been employed in this country except in one hospital), and we find that we are holding these cases very much longer; and if we see them before the glands are much involved we do seem to bring them under control.

DR. JOSEPH MUIR: The histological difference between sarcoma and carcinoma could command extended discussion. While some sarcomas are relatively benign, in most cases we have to deal with the most uncontrollable form of malignancy. Sarcoma is essentially a disease of the *connective tissue*, in which the cells characteristic of the structure affected—epithelial cells, bone cells, whatever they happen to be—are enmeshed. Carcinoma is a definitely encapsulated growth, and in its initial stages, at any rate, can be dealt with with a reasonable certainty of apprehending the full extent of the malignancy. Sarcoma by contrast is a wild thing. It proliferates in all directions—as connective tissue extends everywhere throughout the body—and no matter how we attempt to control it, we can never be sure that we have even reached all of it.

In the antrum any form of malignancy is hard to treat and overcome. Our only possible chance is to lay the lesion wide open so that the radium tubes may be laid directly in contact with the affected tissues. The radium therapist must think of the growth as a mass into which he must direct an amount of radiation sufficient to sterilize every mitotic cell it contains. Each center of radiation is capable of giving off a definite amount within a specified time. If we implant a seed containing three millicuries we know that it will give off radiation effective at a definite distance enough to adequately radiate 4 c.c.m. of tissue. Each seed therefore is encircled in one plane by an imaginary line beyond which we cannot expect tissue change; this we call the limiting isodose line. Our object then is so to place our seeds that these zones of tissue change will be adjacent to one another in such a way that all the mass will receive cross-firing from two directions.

Radium has so far accomplished but little more than surgery in malignancy of the antrum. I have seen, but not reported, 16 cases in the past five years. One of these patients lived three years. In his case an enucleation of the eyeball was necessary in order to place the radium properly. It was undoubtedly made more effective by this means, as the relatively long survival testifies. Sarcoma in the antrum is practically impossible of control. We may have infiltration by direct extension, by the lymphatics, or through conveyance of cells through the blood stream. If it is possible to place radium so that we can sterilize every cell before it has a chance to proliferate, the precise character of the malignant cell makes no particular difference. As the gamma ray is the only one which penetrates we must secure this by adequate filtration. We must also remove the seeds after the desired amount of radiation has been delivered so as to give physiological rest to the tissues. Though radium emanation decays at a definite rate and is reckoned as becoming inert at the end of a certain time, there nevertheless remains a certain element of irritation if seeds are left permanently *in situ*, and the tissues never attain that perfect physiological rest which is essential to the best results in the radium treatment of such malignancies as those under discussion.

In inaccessible regions, such as the antrum, we have always to face the problem of mixed infections. These are the greatest enemies to adequate radium technique. I have of late undertaken a special investigation of this problem, so closely related to the treatment of malignancy, in connection with Professor d'Herelle, of Paris. It is our hope that in the application of the principles of bacteriophage some solution of it may be found.

DR. M. C. MYERSON: I would like to ask Dr. Macpherson why, when he found so extensive a carcinoma he did not have to do an extensive external operation. Also, if the alveolar incision gave sufficient access to permit him to observe and perhaps render future treatment.

In Dr. Klepper's case, may I be permitted to suggest that instead of simply mentioning that the case was diagnosed and treated as Vincent's angina, that he incorporate in the paper the fact that one should not be misled by a positive smear for Vincent's angina in the presence of an ulcerative lesion in the oral or pharyngeal cavity. It is well known that any ulcerative lesion of these regions yields a smear positive for Vincent's spirillae and fusiform bacilli.

I would like to know from those who have had experience with radium implants whether they have any technique to remove all the implants after they have been in place the desired number of hours.

DR. W. W. CARTER: I have had a very interesting case of carcinoma of the uvula and soft palate and, since one of these presentations involves the soft palate, it seems appropriate to recount it here. The patient was a man, about 45 years of age, who came to me with what was evidently a malignant growth of the uvula and right side of the soft palate. I took no chances but relied on my clinical experience to diagnose it as malignant when I first saw him. I sent him at once to the hospital and removed the entire growth, leaving a fairly good margin of normal tissue, into which in a semicircular line I introduced 12 radium seeds. Then I sent the specimen immediately to Dr. Ewing, of Cornell University, telling him that I had already used radium seed on the case.

Upon examining the specimen, Dr. Ewing pronounced it to be an epithelioid carcinoma; he called me up over the phone and told me that it was the most malignant of all the carcinomas and was more apt to metastasize than any other. I told him what I had done, and he approved. The man remained entirely well, so far as local conditions were concerned. Two years after the operation he returned and told me he was having trouble in swallowing, and that food regurgitated. I examined him with the esophagoscope and found a metastatic growth of the lower part of the esophagus. This also was radiated with seed, but without benefit, and he died six months later.

DR. LORE: In speaking of malignancy of the tonsil, I wish to state that the lymphosarcoma case, operated upon four years ago and shown before this Section last year, is alive and as yet has no signs of recurrence or metastasis.

DR. L. GLUSHAK: I would like to be a little clearer about the locality. It sounds like outside of the nasopharynx. I cannot see how the tumor can creep up the Eustachian tube, or does he mean a tumor in the region of the sphenoid?

DR. S. L. RUSKIN: The nasofibromas of the sphenomaxillary fossa are called nasopharyngeal, because they usually have their origin from cartilaginous rests in the region of the orifice of the Eustachian tube and extend laterally into the sphenomaxillary fossa.

Pituitary Tumor. Dr. Alexander Laszlo.

(To appear in a subsequent issue of THE LARYNGOSCOPE.*)*

DISCUSSION.

DR. C. J. IMPERATORI: The dissertation that Dr. Herriman has given us should not be interpreted—particularly by the younger men—as being correct. My experience with conditions in the larynx, and esophagus, has been entirely opposite. Remarks such as Dr. Herriman has made, that are so optimistic, carry a wrong impression, particularly with the younger men. I hope that Dr. Herriman will not take this as a personal attack from me, but I still feel that the younger laryngologists and, may I also add, others should take what has been said with a grain of salt, and a very large one.

DR. H. H. FORBES: I have only one case to report of the early use of radium in the larynx. This was a very doubtful case, but after the examination of four or five specimens, Dr. Michael told me he found evidence of malignancy. That was in the early days, and it was really a surgical feat; by that I mean the larynx was practically destroyed in area of lesion. The woman is still alive, and I feel that we should call her case a cure, now five years ago. In that case there was a small area of malignancy. It was almost a surgical procedure for the destruction of tissue was such that the woman still wears a tracheotomy tube.

My esophageal cases have been reported a number of times, and I have given up the use of radium entirely. I think Dr. Herriman has gone on with his technique rather with the idea of relieving some of these cases, and it is a

question how many of them he will be able to report at the end of two or three years. The work is scientific and I think we should withhold any severe criticism, and the reports made do not claim cures—only relief.

DR. HARMON SMITH: I am satisfied there must be some advantage in the present technique for I have sent in the years past a number of cases of cancer of the larynx to the late Dr. H. H. Janeway and to Dr. Quick, of the Memorial Hospital, and I have not seen any cures. In one case the control lasted 13 years, and in another, nine years; but I have also reported a case that went on for 13 years without anything being done and finally had a laryngectomy, so it is not always the application of radium that may prolong the life of the patient. However, we have hit upon a subject tonight that we older laryngologists have not familiarized ourselves with to the same extent as the younger men. Dr. Robinson has applied radium to a number of my cases in the neck, base of tongue and pharynx with great benefit to the individual, and in some of them I have reason to hope they may be permanently benefited.

DR. HERRIMAN (closing): For the sake of argument I am willing to admit that these patients may not live a day longer when radium has been used for palliative purposes than when morphin is similarly employed. My contention is that whatever life is left to them is lived more comfortably and self-respectingly than is ever seen under the degrading moral effects of morphin. Pain is abolished and moral fibre is strengthened instead of being broken down.

As regards the tongue cases: In the patient here tonight, the lesion has disappeared; he can be examined in the other room. The esophageal cases live along very comfortably; as I said before, two have gone for more than a year, able to eat and go about without pain, and needing no "dope" to enable them to carry on. When the ulceration continues or necrosis takes place from the improper employment of radiation, large blood vessels are likely to be involved and hemorrhage put a rapid finish to the case.

The detection of glandular metastasis is very easy. In all intraoral lesions it takes place early. If the primary lesion in the tongue or elsewhere can be treated before this metastatic process has had time to begin, our chances of bringing about cures would be much better.

My attitude toward using radium in these lesions is similar to that held toward electricity in its early days. We began to use it when we knew little about it. It was realized that it could do a great deal of good and we risked the harm in order to get that good. Later we came to understand better how to use it to avoid accidents, and get good results without injury. This has been the case with radium. We are only beginning to learn how to use it. I think this method of radium implantation with seeds which can be taken out when the treatment is over is a great advance over the older methods of needles or block applicators, or the unscreened glass seeds which caused necrosis and later sloughing. Though up to the present we may not have brought about any spectacular cures, I still believe that we will continue to improve our results, and our efforts will be finally crowned with success.

Tumors of the Nose and Throat Related to Developmental Defects.
Dr. Louise H. Meeker.

(Appears in full in the June, 1929, issue of THE LARYNGOSCOPE.*)*

DISCUSSION.

DR. WARD J. MACNEAL: The embryology of the human body is not simple. If you begin with the single fertilized cell and follow it until you have all the differentiated structures of the adult, you will realize that it is a long story; and if you study the head end of the body, the part with which you are particularly concerned as specialists, you will realize that this development is most complicated. You start with a single cell, and then get a mass of cells, then two vesicles with a thin plate between them, and then a straight line on this plate. This curls up at the front end and processes come forward from the sides and fuse so as to produce a face—it is a wonder that our faces look anything alike at all. In the interior the foregut expands into the pharynx, becomes flattened, and sends out branches in various directions, but nevertheless following a certain regular order, producing the larynx, trachea, lungs, thymus, thyroid and other curious structures with which the endocrinologists deal. A care-

ful dissection of the human body at autopsy will disclose in most instances some anomalous features. We don't pay any attention to these clinically until they cause some disturbance, and Dr. Meeker's paper has indicated how they may play a great part in abnormal conditions in the nose and throat. After listening to the early discussions of the evening, dealing with malignant new growths and the attempts to relieve the conditions due to them, one turns to cysts of the neck with a feeling of relief; you get one of these out and relate it to some embryological structure, and you say: "This is all right," and the patient will not suffer any more.

Occasionally, of course, malignancy develops from one of these, thought not to be dangerous at first. I wish merely to indicate that this is a somewhat complicated field, and if one does not understand embryology he would be in the dark as to the nature of the thing which which he is dealing.

I wish to express my appreciation to the laryngologists who are attempting to be helpful to those who are working in the laboratory. It is true in our own institution, and may be so in others, that there is a more sympathetic understanding between the workers in the laboratory and the head and neck specialists than with other specialists in medicine. This is especially true of the laryngologists. For some reason they seem to have been persuaded that the laboratory will not help them very much unless they have intelligent sympathy and enter into consultation with the laboratory workers. This is necessary, for it is a very difficult field in diagnosis; and we will arrive at the proper understanding only by sympathetic and intelligent co-operation. We in the laboratory make frequent mistakes; but occasionally mistakes are made in the clinics.

Dr. George T. Pack: I wish to congratulate Dr. Meeker on a paper so well prepared and ably presented. Apropos of the congenital origin of tumors of this location, I have in mind certain possible cell inclusions in the roof of the mouth, along the lines of fusion of the lateral maxillary processes with the nasofrontal process. Embryonic cell rests may be deposited along the lines corresponding to the defects of a cleft palate. Within the last two months I have observed three instances of adenoid cystic epithelioma or reticulated epithelioma of the roof of the mouth, which may give credence to the validity of Cohnheim's hypothesis of tumor origin in this location.

This afternoon I removed a small cystic tumor of three years' duration from the midline (dorsum) of the tongue. The anlagen of the human tongue are found in two posterior mandibular processes which enclose the foramen caecum between them and grow anteriorly to fuse with a third rudiment, the tuberculum impar. The tumor just mentioned occurred at this putative point of junction and was, presumably, of congenital origin.

The cholesteatoma or pearly tumor of Cruveilhier is a heteroplastic formation arising from embryonal aberrant epidermal inclusions. This should not be confused with the pseudo-cholesteatomas of the middle ear, which are not true tumors and should be designated as cholesteatoses or as caseous metamorphoses. The true cholesteatomas occur more commonly in the cranial fossae, but sometimes are found in the accessory nasal sinuses. Therefore they should be included among those regional tumors of congenital nature.

In a recent statistical analysis of 25,000 tumor cases at the Memorial Hospital, I found 24 instances of the so-called branchiogenic carcinomas of the neck. Although there is undoubtedly a tumor entity of this congenital origin, some of these 24 cases can be attributed to faulty diagnoses of secondary or metastatic cancers from unrecognized minute primary foci in the nose, throat, tonsil and base of tongue. Dr. Max Cutler in his thorough study of the transitional cell carcinoma and Dr. Regaud and Dr. Schminke with the "lymphoepitheliome", have shown conclusively that voluminous neck adenopathies may occur with unrecognized and unsuspected primary intra-oral foci. In the light of these discoveries, we must consider the true branchiogenic carcinoma as a quite rare tumor.

Dr. Meeker (closing): Dr. Pack is apparently very familiar with the pathology of the nose and throat. Cholesteatoma was not mentioned in these tumors for the reason that I included only those which show within the cavity of the nose and throat. Lymphoepithelioma is certainly to be considered in the case of possible chordoma shown upon the screen. We have hesitated to make such

a diagnosis in this case because of the involvement of the bodies of the upper cervical vertebrae.

DR. SHEEHAN presented a series of motion pictures in colors of actual operations. Before the projection he gave a brief outline of the cases to be shown. These may be enumerated as follows:

1. Operation for relief of unilateral facial paralysis, under local anesthesia, through use of sustaining strips of fascia lata. The areas above the mouth are drawn to the normal relation and held in position by these strips, two of which are made fast in the parotid area and one over the temporal muscle. The action of this strip, influenced by the play of the muscle, gives the appearance of facial motion. Further photographs of earlier cases would demonstrate the durability of the fascia under these tensions.

2. The procedure for excision of costal cartilage, for use in repairs of the nose or face. As the patient went into shock before the cartilage could be used for the repair, it was stored under the breast. This is also shown. This storage, which may be for a considerable time, leaves the cartilage unaffected, a fact which of itself demonstrates the viability of the cartilage when implanted among other tissues of the same body, as the nose and other situations.

3. In the past two years resort to costal cartilage for nasal correction has been necessary only six times. The alternative method, of obtaining the cartilage needed for filling nasal depressions from the lower (or upper) lateral cartilages, hypertrophied after trauma and often twice their natural thickness, is demonstrated from actual cases. Morsels taken from these thickened cartilages, sewn together or superimposed, in most instances provide the requisite quantity, so that other areas of the body need not be invaded to obtain the supporting material.

4. An operation for the excision of a carcinoma, partly intrinsic to the larynx, partly extrinsic, involving the epiglottis down to and including the vocal chord on the left side. The operation was by diathermy and under local anesthesia. Attention was directed to the method. After exposing the larynx and trachea, the method advocated by Lamaitre, of Paris, was adopted to avoid the gush of air at the insertion of the tube. This consists of installing into the trachea, between the rings, with a fine needle, 5 drops of cocain in 20 per cent solution. A wait of a few minutes is taken to allow for the full effect. Then the trachea is opened to admit of insertion of the tracheotomy tube. Exposure of the larynx is by the route of Sir St. Clair Thomson, of London, the incision extending well up to the soft tissues of the larynx, giving direct view of the part to be excised. The views indicate very effectively the superiority of diathermic excision. The facility is greater, and the cartilaginous parts do not slough or necrose. The method is better, when skillfully applied, than the radical operation with steel, and in cases of small growths is greatly to be preferred both to the steel and to radium or X-ray.

Dr. Sheehan mentioned that these were the first photographic reproductions in motion and color of actual operations. Their effect was to enable observers to visualize, with absolutely lifelike precision, the actual procedures in the theatre.

It may be said that the ability to produce the actual colors on the screen is determined first, by taking alternate images through two lenses, one of which receives the image through a filter in which red is tempered with yellow, and the other in which blue dominates, but also with an admixture of yellow, thus covering the spectrum as relates to the three primary colors. These images are projected through filters of the same values, again through two lenses, coordination of the filters on a revolving disc assuring from an ordinary film reproduction that is measurably perfect. In illustration, he asked that note be taken of the change of facial coloration marking the passage of the patient into shock.